Museum Library

MAY 4 1942

Old Series Vol. XVI | CONTINUATION OF THE BULLETIN OF THE NORTHEASTERN BIRD-BANDING ASSOCIATION | New Series Vol. XIII

BIRD-BANDING

A Journal of Ornithological Investigation

Vol. XIII April 1942 No. 2

PUBLISHED FOR
THE NORTHEASTERN BIRD-BANDING ASSOCIATION
THE EASTERN BIRD-BANDING ASSOCIATION
AND
THE INLAND BIRD-BANDING ASSOCIATION

CONTENTS

PAGE

Migratory Movements of Chimney Swifts
By *John B. Calhoun and J. C. Dickinson, Jr.* 57

Returns from Banded Birds; Longevity Records of Wild Birds
By *May Thacher Cooke* 70

The Brown Thrasher and the Territory Theory
By *Aretas A. Saunders* 75

Trapping the Snow Bunting
By *Oscar McKinley Bryens* 77

Instances of the Spring Migration of the Blue Jay
By *Harrison F. Lewis* 79

Returns and Survival Rate of Wintering Tree Sparrows
By *George J. Wallace* 81

A Trap for Bank Swallows
By *William A. Morris* 83

General Notes. Another Slate-colored Junco at Least Eight Years Old, 85; A Life History is Completed, 85.

Recent Literature. Banding, 86; Migration, 86; Longevity, 86; Life History, 86; Territory, 90; Bird Behavior, 91; Physiological Experiments, 93; Ecology and Numbers, 93; Birds and Their Food, 95; Books, 96.

BANDING CHIMNEY SWIFTS

BIRD-BANDING

A JOURNAL OF ORNITHOLOGICAL INVESTIGATION

VOL. XIII APRIL, 1942 No. 2

MIGRATORY MOVEMENTS OF CHIMNEY SWIFTS, *Chaetura pelagica* (Linnaeus) TRAPPED AT CHARLOTTESVILLE, VIRGINIA[1]

BY JOHN B. CALHOUN and J. C. DICKINSON, JR.

INTRODUCTION

FIELD observations may show that a given species of bird is present in one part of its range at one time of the year and in another part at a different time, but afford little information as to the exact route followed by individual birds or groups of birds. To obtain such information was one of the aims of the American Bird Banding Association organized in 1909. So great was the interest in this undertaking that the amount of banding that was carried out soon began to overtax the capacities of this private organization. In 1920 the work was taken over by the United Stat s Biological Survey, under whose auspices 3,712,327 birds had been marked with aluminum bands by the end of 1940.

Among this number there have been banded over 265,000 Chimney Swifts, (*Chaetura pelagica* (Linnaeus)), during the past twenty years. Stoddard (1926) described the method of banding swifts as developed by C. A. Handley, which in its essentials has been followed by all later workers (Green, 1940; Peters, 1937). It is to be regretted that all the banding operators have not published on the results of their Chimney Swift banding operations, for even though most of the records are filed with the Fish and Wildlife Service of the United States Department of the Interior, formerly the Biological Survey, it is the individual operator who can best analyze the results derived from the particular conditions under which his banding operations were conducted.

During the fall of 1936 H. S. Peters (1937) in banding 21,503 swifts in six towns in Alabama and in Atlanta, Georgia found that at this season there occurred considerable random movement between the stations, ranging from 5 to 105 miles. Calhoun (1938) discusses the interstation movements on the basis of 15,876 birds banded at Nashville, Tennessee by Amelia R. Laskey and himself in the fall of 1938. Since at each banding station Chimney Swifts

[1] Joint contribution from the Department of Zoology, Northwestern University and the Department of Biology, University of Florida.

were captured from all other sites of banding in Nashville, it was evident that there was no rigid flock unity. In the evenings the swifts evidently stop at the first convenient chimney roost depending on where their day's wanderings have taken them. Thus in any flock at a given chimney the numbers may remain fairly constant from day to day although the flock composition may change due to local movements rather than to an influx of swifts from more northern points. At all times parts of a fall flock are in migration, moving southward or southwestward, and these are replaced by migrants from the north. For this reason there is only a gradual change in the composition of the Chimney Swift population in an area of concentration, such as a city with many fireless chimneys. The actual status of the unity of fall flocks will probably never be known. However, both Peters and Calhoun report one erratic movement at this season. This is a northeasterly wandering in the fall up to five hundred miles, a type of wandering which is the rule with such birds as the Little Blue Heron (*Florida caerulea* (Linnaeus)), the Wood Ibis (*Mycteria americana* Linnaeus), and others.

Coffey (1938) includes a map of Chimney Swift recoveries between Tennessee (Clarksville, Memphis, and Nashville) and other points in eastern North America. It shows that swifts passing through middle and western Tennessee are predominantly restricted to the western side of the Appalachian system.

Green (1940) discusses the results of an excellent swift banding project which was conducted from another Tennessee banding station, Chattanooga and environs. Of the 17,165 swifts banded in 1928 to 1930, many were recovered at widely separated points in eastern North America in the ensuing ten years. Many interesting data are given on longevity. According to Pond (1940), who synthesized the data from Green's paper, the number recovered after one to eleven years from the date of banding are respectively: 1 year (406), 2 years (147), 3 years (20), 4 years (11), 5 years (17), 6 years (8), 7 years (3), 9 years (3), 10 years (1), 11 years (1). Green's foreign recovery[2] records show that the members of a fall banded flock are widely scattered at or about the same time in the following spring. We believe this indicates that the spring migration is a hurried one and that different groups of swifts in the same migration route assume different rates of migration.

BANDING AT CHARLOTTESVILLE, VIRGINIA

Banding operations with the Chimney Swift at Charlottesville were preceded by two years of observation on their migratory behavior in that region. It was noted that flocking of these birds occurred in approximately equal intensity both in the fall and in

[2] A foreign recovery is a bird recaptured at a later date at a locality other than that at which it was banded.

the spring. In many regions where banding operations with this species have been conducted, spring flocking rarely occurs. In Gainesville, Florida, Dickinson has observed only small flocks in the spring. For the most part these Florida flocks have been composed of about 25–30 birds as opposed to flocks of 1,000-1,500 in the fall. The occurrence of flocking at both seasons at Charlottesville made this region an ideal one in which to carry out banding operations. Another ideal factor is that the residential nature and small size of Charlottesville (population, 19,400) provides only a few large chimneys in schools, churches, etc., where night roosting of large flocks occur.

With these factors in mind Dickinson and Calhoun began banding operations in the fall of 1937. In this and the following season the capture of larger flocks was made possible by covering over with wire screen the majority of the chimneys in use as roosting sites, which caused the swifts to concentrate in the remaining available chimneys.

The authors wish to express their thanks to James M. Vardaman, who has kindly made accessible to them a complete record of the Chimney Swift banding operations which he conducted at Charlottesville during the fall of 1939 and the spring of 1940. We are indebted to Dr. Johnson, superintendent of the city schools, who allowed us to place screen covers on the chimneys and air shafts of all the city schools. We are also indebted to Mr. Hartman, superintendent of buildings and grounds at the University of Virginia, for his cooperation in our banding operations on the University of Virginia campus buildings. Dr. Ivy F. Lewis, chairman of the Miller School of Biology at the University of Virginia, kindly allowed us the use of one of the Mountain Lake Biological Station station-wagons from time to time to transport our equipment. To the many others who assisted us in the actual banding operations we here express our appreciation.

TABLE 1. SEASONAL DATA OF CHIMNEY SWIFTS CAPTURED

Season	*Number Banded*	*Number of Returns*	*Number of Repeats*	*Number of Foreign Swifts*	*Total Number Handled*	*Percentage of Total Swifts Handled*[3]
Spring of 1936....	32			1	176[4]	0.76
Fall of 1937.....	1,186		18	4	1,208	5.20
Spring of 1938....	3,874	64	151	6	4,095	18.04
Fall of 1938.....	4,706	177	100	6	4,989	21.97
Spring of 1939....	7,512	737	54	24	8,327	36.67
Fall of 1939.....	2,068	178	47	7	2,300	10.01
Spring of 1940....	1,473	120	15	5	1,613	7.10
Total of all seasons	20,851	1,276	385	53	22,708	100.00

SEASON OF 1936

SPRING. Banding operations at Charlottesville were begun by Calhoun with a small and crude trap. 176 swifts were captured (174 on April 19, and 2 on April 26). Of these 32 were banded and the remainder released. One of these was subsequently captured at Opelika, Alabama, Sept. 1936. Banding operations were discontinued due to lack of equipment and assistance.

SEASON OF 1937

FALL. Dickinson and Calhoun with improved apparatus resumed banding operations. Their work continued through the spring of 1939. The 1,186 swifts banded during this season were as follows: 144 on Oct. 2; 566 on Oct. 3; and 476 on Oct. 10.

Recoveries of foreign banded swifts at Charlottesville: On Oct. 3: Kingston, Ont., May 12, 1934 (1); Kingston, Ont., May 16, 1937 (1); Tuskegee, Ala., Oct. 9, 1936 (1). On Oct. 10: Tilton, N. H., Aug. 27, 1937 (1).

Charlottesville banded swifts captured elsewhere: From Oct. 2: Macon, Ga., Sept. 22, 1940 (1). From Oct. 3: Hufsmith, Texas, April 30, 1940 (1); Macon, Ga., Sept. 22, 1940 (1). From Oct. 10: West Gloucester, Mass., June 1938 (1).

SEASON OF 1938

SPRING. The 3,874 banded during this season were as follows: 134 on April 21; 17 on April 22; 134 on April 23; 112 on April 30; 100 on May 2; 434 on May 13; and 2,943 on May 15.

Recoveries of foreign banded swifts at Charlottesville: On April 23: Opelika, Ala. Oct. 6, 1936 (1). On May 13: Opelika, Ala., Sept. 26, 1936 (1). On May 15: Tuskegee, Ala., Oct. 9, 1936 (1); Atlanta, Ga., Oct. 10, 1936 (4).

Charlottesville banded swifts captured elsewhere: From April 22: Boonesville, Va. (near Charlottesville), May 2, 1938 (1). From May 2: Cape May, N. J., May 19, 1938 (1). From May 13: Red Hill, Va. (near Charlottesville), May 20, 1938 (1); Algonquin Park, Ont., May 30, 1938 (1); Nashville, Tenn., Sept. 5, 1938 (1); Baton Rouge, La., Sept. 27, 1938 (1); 12 miles east of Charlottesville, Va., June 4, 1939 (1). From May 15: Barnleys, Va. (near Charlottesville), May 21, 1938 (1); Crozet, Va. (near Charlottesville), July 2, 1938 (1); Charlottesville, Va., July 18, 1938 (2); Nashville, Tenn., Sept. 7, 1938 (1); Nashville, Tenn., Sept. 10, 1938 (1)—(This swift was also retrapped at Charlottesville on April 28 and May 2, 1939); Baton Rouge, La., Oct. 1, 1938 (1); Baton Rouge, La., Oct. 8, 1938 (1); Standardsville, Va. (near Charlottesville), April 23, 1939 (1); Nashville, Tenn., Sept. 13, 1939 (1)—(This swift was also retrapped at Charlottesville on May 2, 1939); Ash Lawn, Va. (near Charlottesville), May 3, 1940 (1)—(This swift was also retrapped at Charlottesville on Oct. 1, 1938); near Charlottesville, Va., April 21, 1941 (1)—(This swift, No. 38-173936, which had been retrapped previously at Charlottesville on May 2, 1939 was captured on April 21, 1941 by Dr. S. W. Britton who found it nesting in his home with No. 40-37259 that was banded May 6, 1940); near Charlottesville, Va., May 1, 1941 (1).

FALL. The 4,706 banded during this season were as follows: 1,283 on Sept. 11; and 3,423 on Oct. 1.

[3] Percentage of total swifts handled = $\frac{\text{Total No. handled per season.}}{\text{Total No. handled in all seasons.}}$

[4] 143 swifts were released unbanded after they had been examined for foreign bands.

Recoveries of foreign banded swifts at Charlottesville: On Sept. 11: Memphis, Tenn., Oct. 1, 1936 (1); Athens, Ga., Oct. 11, 1936 (1). On Oct. 1: Tuskegee, Ala., Oct. 9, 1936 (1); Kingston, Ont., May 16, 1937 (1); Kingston, Ont., May 22, 1938 (1); Clarksville, Tenn., Sept. 11, 1938 (1). (In the twenty days that elapsed since the banding of this swift and its recapture in Charlottesville it had traveled 480 miles northeast and may have crossed the Appalachian Mountains.)

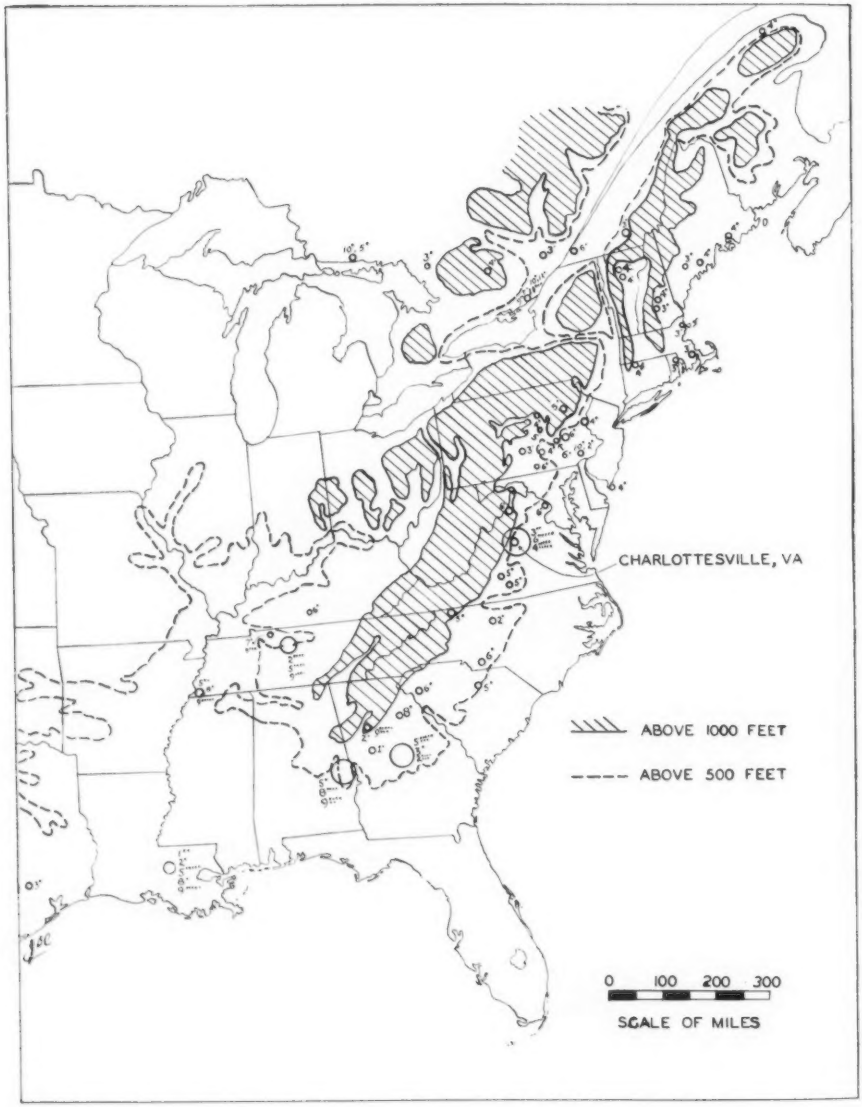
Charlottesville banded swifts captured elsewhere: From Sept. 11: Concord, Ga., Sept. 25, 1938 (1); Baton Rouge, La., Oct. 8, 1938 (2); Free Union, Va. (near Charlottesville), May 12, 1939 (1); Buckingham, Quebec, July 16, 1939 (1); Round Oak, Ga., Sept. 17, 1939 (1); Nashville, Tenn., Sept. 23, 1939 (1); Macon, Ga., May 5, 1940 (1); Greensboro, N. C., August, 1940 (1); Macon, Ga., Sept. 20, 1940 (1); Macon, Ga., Sept. 22, 1940 (1). From Oct. 1: East Waterford, Pa., May 1939 (1); Lake Auburn, Maine, June 1, 1939 (1); Nashville, Tenn., Aug. 14, 1939 (1); Chester, Pa., Sept. 1, 1939 (1); Nashville, Tenn., Sept. 13, 1939 (1); Baton Rouge, La., Oct. 7, 1939 (1); Macon, Ga., Sept. 22, 1939 (2); Standardsville, Va. (near Charlottesville), May 12, 1940 (1); Bridgewater, Mass., May 12, 1940 (1); Concord, N. H., May 20, 1940 (1); Arcadia, R. I., June 6, 1940 (1); Macon, Ga., Sept. 22, 1940 (1); Atlanta, Ga., Sept. 25, 1940 (1); Nashville, Tenn., Oct. 1, 1940 (1).

SEASON OF 1939

SPRING. The 7,512 banded during this season were as follows: 7 on April 27; 293 on April 28; 3,200 on May 2; 1,485 on May 13; and 2,527 on May 14.

Recoveries of foreign banded swifts at Charlottesville: On May 2: Kingston, Ont. (No. 38-86359, date of banding unknown) (1); Kingston, Ont., May 12, 1935 (1); Opelika, Ala., Sept. 20, 1936 (1); Atlanta, Ga., Oct. 10, 1936 (1); Memphis, Tenn., Sept. 19, 1937 (1); Opelika, Ala., Sept. 21, 1937 (1); Memphis, Tenn., Oct. 4, 1937 (1); Baton Rouge, La., Oct. 15, 1937 (1); Chester, Pa., June 6, 1938 (1); Nashville, Tenn., Sept. 5, 1938 (1); Nashville, Tenn., Sept. 23, 1938 (1); Clarksville, Tenn., Sept. 24, 1938 (1); Baton Rouge, La., Oct. 1, 1938 (2). On May 13: Opelika, Ala., Sept. 20, 1936 (1); Kingston, Ont., Sept. 20, 1937 (1); Blind River, Ont., Aug. 23, 1938 (1); Nashville, Tenn., Aug. 27, 1938 (1); Clarksville, Tenn., Sept. 11, 1938 (1); Memphis, Tenn., Sept. 21, 1938 (1); Clarksville, Tenn., Sept. 24, 1938 (1); Baton Rouge, La., Oct. 1, 1938 (1).

Charlottesville banded swifts captured elsewhere: From May 2: Carlisle, Pa., May 27, 1939 (1); Montoursville, Pa., June 1, 1939 (1); Ennice, N. C., Aug. 18, 1939 (1); Nashville, Tenn., Sept. 9, 1939 (1); Nashville, Tenn., Oct. 1, 1939 (1); Memphis, Tenn., Oct. 8, 1939 (1); Edinburg, Va., May 8, 1940 (1); Hamburg, Pa., May 8, 1940 (1); Fairfax, Va., May 10, 1940 (1); Gettysburg, Pa., June 1, 1940 (1); Milton, Pa., August, 1940 (1); Macon, Ga., Sept. 20, 1940 (1); Macon, Ga., Sept. 22, 1940 (1); Macon, Ga., Oct., 3, 1940 (1). From May 13: Arvonia, Va. (25 miles south of Charlottesville), May 15, 1939 (1); Ellsworth Falls, Maine, June 1939 (1); Calais, Vt., June 13, 1939 (1); Blind River, Ont., Aug. 21, 1939 (1); Altavista, Va., Aug. 27, 1939 (1); Memphis, Tenn., Oct. 1, 1939 (1); Camden, S. C., Oct. 3, 1939 (1); Nathalie, Va., Oct. 5, 1939 (1); Baton Rouge, La., Oct. 14, 1939 (1); Glasgow, Ky., May 4, 1940 (1); Marshville, N. C., May 5, 1940 (1); Mont-Joli, Matane Co., Quebec, June 9, 1940 (1). From May 14: Raubsville, Pa., May 20, 1939 (1); Mt. Royal, Montreal, Quebec, May 25, 1939 (1); Cedar Grove, Maine, June 1, 1939 (1); Dyke, Va. (near Charlottesville), June 2, 1939 (1); 12 miles east of Charlottesville, Va., June 4, 1939 (1); Ruckersville, Va. (near Charlottesville), June 17, 1939 (1); Ruckersville, Va., July, 1939 (1); La France, Anderson Co., S. C., April 23, 1940 (1); Standardsville, Va. (near Charlottesville), May 12, 1940 (1); Wilkes-Barre, Pa., Aug. 28, 1940


CHARLOTTESVILLE, VA
ABOVE 1000 FEET
ABOVE 500 FEET
0 100 200 300
SCALE OF MILES

(1); Milledgeville, Ga., Oct. 1, 1940 (2); Macon, Ga., Oct. 3, 1940 (1); Milledgeville, Ga., Oct. 6, 1940 (1); Newmanstown, Pa., May 12, 1941 (1).

FALL. The banding operations were entirely taken over by Vardaman who continued the work through the spring season of 1940. The 2,068 banded during this season were as follows: 855 on Sept. 16; 337 on Sept. 21; 554 on Sept. 22; 79 on Sept. 29; 253 on Oct. 4.

Recoveries of foreign banded swifts at Charlottesville: On Sept. 16: Kingston, Ont., May 24, 1936 (1); Opelika, Ala., Sept. 21, 1936 (1); Memphis, Tenn., Sept. 21, 1938 (1). From Sept. 22: Loachapoka, Ala., Sept. 19, 1936 (1); Kingston, Ont., May 15, 1938 (1); Baton Rouge, La., Oct. 1, 1938 (1).

Charlottesville banded swifts captured elsewhere: From Sept. 21: Stokes Center, via Sherbrooke, Quebec, May 31, 1940. From Sept. 22: Magnetawan, Ontario, June 30, 1940.

SEASON OF 1940

SPRING. The 1,473 banded during this season were as follows: 105 on May 3; 118 on May 6; 445 on May 8, 558 on May 10; 87 on May 16; and 160 on May 18.

Recoveries of foreign banded swifts at Charlottesville: On May 3: Atlanta, Ga., Oct. 11, 1936 (1). On May 10: Nashville, Tenn., Aug. 31, 1938 (1); On May 18: Baton Rouge, La., Oct. 12, 1937 (1).

Charlottesville banded swifts captured elsewhere: West Hartland, Conn., May 30, 1940 (1); Stowe, Vt., June 10, 1940 (1); Macon, Ga., Oct. 3, 1940 (1); near Charlottesville, Va., April 21, 1941 (1).

KEY TO THE RECOVERIES OF CHIMNEY SWIFTS SHOWN ON THE MAP

Each dot following one of the key numbers represents one Chimney Swift recovery. For the purpose of analyzing the recoveries the pre-breeding and breeding season is empirically set as from April through July, and the post-breeding season from August through October. Recoveries fall into two groups:

Group I. Swifts banded at Charlottesville and later recovered elsewhere. The key numbers for this group are placed on the map at the place of recovery.

1. Fall banded swifts recovered the same fall.
2. Fall banded swifts recovered in a subsequent post-breeding season.
3. Fall banded swifts recovered in a subsequent pre-breeding or breeding season.
4. Spring banded swifts recovered the same pre-breeding or breeding season.
5. Spring banded swifts recovered in a subsequent post-breeding season.
6. Spring banded swifts recovered in a subsequent pre-breeding or breeding season.

Group II. Swifts banded in other places in the United States and Canada and later recovered at Charlottesville. The key numbers for this group are placed on the map at the place of banding.

7. Fall banded swifts recovered the same post-breeding season.
8. Fall banded swifts recovered in a subsequent post-breeding season.
9. Fall banded swifts recovered in a subsequent pre-breeding or breeding season.
10. Spring banded swifts recovered in a subsequent pre-breeding or breeding season.
11. Spring banded swifts recovered in a subsequent post-breeding season (i.e. during another year).
12. Spring banded swifts recovered in the fall of the same year.

ANALYSIS OF RECOVERY RECORDS

Recovery records indicate that practically all of the spring migration of swifts, which were banded in Charlottesville either during the spring or fall, takes place between the elevations of 500 and 1,000 feet. For this reason we have chosen to designate this flyway as the Piedmont Flyway (see map index numbers 3 and 6). While there are in our records twenty recoveries of northbound migrants stretched along the eastern slope of the Appalachian Mountains from Georgia to Maine, there is only one from west of the Appalachians. The latter is from south-central Kentucky. Taking into consideration the evidence furnished by the above twenty-one records and correlating it with the fact that there is only one definite record of a swift which may have flown across the Appalachian mountains from Clarksville, Tennessee to Charlottesville (see seasonal data, fall season of 1939), it is evident that the five recoveries of Charlottesville banded birds that were recovered as breeders in the St. Lawrence drainage system, probably indicate that these birds utilized the valleys of the Hudson, or Mohawk Rivers to reach their breeding grounds. These valleys form the only major breaks in the Appalachians below an elevation of 1,000 feet. The capture in Charlottesville of eight swifts banded in Kingston, Ontario at the northern end of Lake Ontario (two of which were recovered the same year that they were banded) offer additional support to this "valley flyway" hypothesis. The fact that swifts banded in the above mentioned area migrate along the west as well as the east side of the Appalachian mountains is evidenced by the fact that Calhoun, and also Coffey, record the capture of eight and seven Kingston banded swifts in Nashville and Memphis, Tennessee, respectively.

The capture in Nashville, Tennessee of four of our fall-banded swifts during subsequent fall seasons shows that the same swift may during one fall season use the Piedmont Flyway and during another fall season the Mississippi Flyway. At least with Chimney Swifts, there are no definite, well fixed routes from the aspect of the individual; although from the standpoint of the population as a whole certain general fixed routes are quite well determined. The recovery of spring banded swifts (see index number 5 on the map), which at the time of banding were either residents or were migrating northward, also shows a bifurcation of the fall migration route. Although the majority (14) used the Piedmont flyway, a considerable number (7) were captured in the Mississippi flyway. Two of these seven form the most interesting of all the recovery records. They were each banded May 15, 1938. One of these was captured Sept. 10, 1938 at Nashville, Tennessee by Amelia R. Laskey, and the following spring it was recaptured at Charlottesville on April 28,

and May 2, 1939. The other swift was recaptured May 2, 1939 at Charlottesville, and then on Sept. 13, 1939 it was caught at Nashville, Tennessee, also by Amelia R. Laskey. Here is found additional evidence that those Charlottesville banded swifts, which may use the Mississippi Flyway in the fall, customarily use the Piedmont Flyway in the spring.

As mentioned above the Piedmont Flyway south of New York is limited mainly to the region lying between the 500 and the 1,000 foot lines of elevation. There then must be some limiting factor which separates this group of migrating swifts from the hordes of swifts which migrate along the Atlantic Coastal Plain. The authors are unable to arrive at a satisfactory explanation for this phenomenon. The actual barrier is probably an ecological one, but its nature yet remains to be determined. At first it was thought that the earlier season of the coastal region allowed an earlier influx of swifts into that region in the spring, which, from the population aspect, might act as a barrier when migration of swifts began through the Piedmont region. However, the migration dates listed in the *Raven* (the official publication of the Virginia Society of Ornithology) give no supporting data for this hypothesis. In fact, the average of four spring arrival dates for the coastal plain was April 16, and for the Piedmont region of Virginia an average of seven spring arrival dates was April 14.

Green (1940) lays particular stress on the fact that at about the same time of the year he had recoveries of his swifts from a single banding date from widely separated points in the United States and Canada. Our records give little evidence of the occurrence of this phenomenon. Yet there are a few instances of it having happened. On May 12, 1940 one swift was recovered near Charlottesville, which had been banded on Oct. 1, 1938; and another from this same date of banding was recovered May 12, 1940 at Bridgewater, Mass. Two other swifts, banded May 2, 1939, were caught on May 8, 1940, one at Edinburg, Va. and the other at Hamburg, Pa. Another from this same date of banding was captured four days earlier, May 4, 1940, at Glasgow, Kentucky. There is nothing unusual in having two swifts from the same date of banding recovered on the same day at widely separated localities; for one of these may stop and begin nesting activities while another may continue north to another breeding area.

In contrast to the above recovery records, the return records show that there is some flock unity. Among the several groups of banded swifts associated together the most outstanding are: (1) six swifts captured as a group on April 21, and May 15, 1938, and on May 14, 1939; (2) twelve swifts captured as a group on May 15, 1938, and on May 2 and May 14, 1939; (3) four swifts captured as a group on May 15, 1938, on Sept. 11, 1938, and on May 14, 1939;

and (4) the most striking example, is of nine swifts which were captured as a group in Charlottesville on May 15, 1938, on Oct. 1, 1938, and on May 14, 1939. As shown on the accompanying map, our records, when coordinated with those of Green and Coffey, seem to indicate a merging of the birds that have utilized the Piedmont Flyway with those that have used the Mississippi Flyway for their southward migration. This merging of units probably takes place in Louisiana and eastern Texas.

A brief summary of the above data is presented here: The northward spring migration of swifts which passes through Charlottesville is mainly limited to the region lying between the 500 foot and the 1,000 foot lines of elevation. It is for this reason that this flyway is here called the Piedmont Flyway. In the lower Hudson valley the Piedmont Flyway divides. Part of the spring migrants continue northeastward between the coast and the mountains through Connecticut, Massachusetts, Vermont, New Hampshire, and Maine between the coast and the mountains. The remainder pass through the Hudson and Mohawk valleys where they spread northeastward along the St. Lawrence to its mouth and northwest along the Great Lakes to Blind River on the North Channel of Lake Huron. In the fall the majority of these swifts retrace the route of their spring migration. As they reach the southern tip of the Appalachians in Georgia and Alabama they swing west through Louisiana and Texas. However, many of the northern resident swifts, instead of again traversing the above mentioned valleys to enter the Piedmont Flyway, turn southwest where they use the eastern stretches of the Mississippi Flyway. The two groups of swifts again merge in Louisiana and probably in eastern Texas. Due to the paucity of spring swift banding operations west of the Appalachians it is not known whether any of the northern resident swifts, which used the Mississippi Flyway in the spring, utilize the Piedmont Flyway in the fall.

The 1,276 Chimney Swifts, which were captured in Charlottesville at a later season than the one during which they were banded, give abundant data to show that there is considerable permanence to the flyway used by the swifts which pass through Charlottesville. We have records of 73 birds that returned twice or more. This means that each of these was handled in at least three different seasons. In addition some of these swifts repeated again during the season of their return. Seven were captured during three spring seasons, fifty-one during one fall and two spring seasons, three during two fall and one spring season, nine during one fall and three spring seasons, and one during two fall and three spring seasons (five consecutive seasons).

During each season of banding there were returns from all the previous seasons of banding. However, due to the fact that different

numbers were banded or handled during each season, it would not be legitimate to make direct comparison of return records for one season with those of another. To make such comparisons the return records must be reduced to a common denominator, which for convenience is here designated the *Return Index*.[5]

ANALYSIS OF RETURN RECORDS[6]

TABLE 2. RETURN DATA

Season of Banding	*Number of Returns, with Return Index by Season of Recapture Shown in Parenthesis*				
	Spring of 1938	*Fall of 1938*	*Spring of 1939*	*Fall of 1939*	*Spring of 1940*
Spring of 1936.....	3(6.5)				
Fall of 1937.....	64(3.7)	31(1.1)	31(0.7)	14(1.2)	4(0.5)
Spring of 1938.....		101(1.1)	605(4.3)	35(0.9)	24(0.8)
Fall of 1938.....			101(0.6)	97(1.9)	12(0.3)
Spring of 1939.....				36(0.5)	52(0.9)
Fall of 1939.....					25(1.7)

TABLE 3. RETURN INDICES[7]

	Fall banded swifts		*Spring banded swifts*	
	Returned in Fall	*Returned in Spring*	*Returned in Fall*	*Returned in Spring*
	1.1	3.7	1.1	6.5
	1.2	0.7	0.9	4.3
	1.9	0.5	0.5	0.8
		0.6		0.9
		0.3		
		1.7		
Total	4.2	7.5	2.5	12.5
Average	1.4	1.25	0.83	31.3

It is shown in Table 3 that the average Return Index for the fall banded swifts is nearly the same in both subsequent spring and fall seasons. For this group the Return Index is slightly higher in the fall due to the fact that fall trapping was always conducted from mid-September to mid-October, while the period of spring banding operations varied considerably. In contrast to this it will be noted that the average Return Index for spring banded swifts is much less in the fall than in the spring. At first glance, it might be assumed that just the opposite would be true, since those spring

[5] This index is derived by dividing the number of returns per season per 1,000 birds banded, by the number of birds handled during the season of return in terms of the percentage (see Table 1) of the total number of birds handled for all seasons during which banding operations were conducted.

[6] A *return* is a bird captured or found dead at the same locality where it was banded, but at a different season. Some writers have used the term, *local recovery*, synonymously with return. In contrast to a return a *repeat* is a swift which is captured again during the same season and at the same locality that it had already been caught previously.

[7] For the specific season that each Return Index refers to see Table 2.

banded swifts recovered in a subsequent spring must have undergone the dangers of a long migration to unknown regions of Central or South America. However, a more careful consideration of the data shows that this small Return Index of spring banded birds in the fall is just what should be expected, due to the fact that many of the spring banded swifts were residents at the time of their banding, but by the time fall banding operations were started they had already begun their southern migration. It may also be pointed out that the fall Return Index of spring banded swifts is further reduced, due to the fact that some of the swifts, which nest in the northern part of their range, return south in the fall by the Mississippi Flyway. It may also be noted that the Return Index for spring banded swifts recovered in the spring is nearly three times as large as for fall banded swifts recovered in the spring. This discrepancy seems to be due to: (a) the large number of resident swifts banded in the spring, and (b) the fact that swifts nesting farther north (*i.e.* those which are more often banded in the more leisurely southward fall migration) do not linger long in the northward flight and thus would not have as great a chance of being trapped for banding in the spring as the resident swifts.

In brief the Return Index data indicate that (a) the majority of the Chimney Swifts migrating through Charlottesville, Virginia follow a definitely limited path (the Piedmont Flyway) in both their fall and spring migrations, (b) the spring migration is a hurried one with the main mass of migrants arriving at once, from which the resident swifts remain and the more northern nesters immediately move on, and (c) the fall migration is a more leisurely one in which by mid-September the majority of the resident swifts have already moved to more southern regions.

WINTER HOME

Considering the nearly total lack of information concerning the winter home of the Chimney Swift or even concerning the migratory habits in Central America and southward, it may be well to bring to attention some field observations of Wenzel (1928). During a stay at El Zapote coffee plantation at an elevation of 1,500 feet in the Escuintla Mountains on the west coast of Guatemala, Wenzel observed winter flocking of the Chimney Swift. On the plantation there was a thirty foot chimney on an abandoned sugar factory. In its vicinity he says that there annually appear from the north, toward the end of December or the beginning of January, migrating Chimney Swifts, which remain for a very long time. He gives an excellent account of their evening drill. At the beginning of January the flock is small, but it increases in number from day to day until the flock reaches an estimated 20,000. It was not determined how many weeks they remained in this locality.

SUMMARY

Data: During the six seasons from the fall of 1937 through the spring of 1940 in which intensive banding operations were conducted at Charlottesville, Virginia, 20,851 Chimney Swifts were banded. Of these 1,276 were later recaptured during another season at Charlottesville and 95 were recovered at points varying from 5 to 700 miles from Charlottesville. Captured at Charlottesville were 54 chimney swifts that had been banded in various places over the United States and Canada.

Migration routes: The Chimney Swifts which pass through Charlottesville follow a route which seems to be limited on the east side of the Appalachian Mountains to the Piedmont Region lying at an elevation between 500 and 1,000 feet. This flyway between Alabama and southern New York is designated the Piedmont Flyway. In New York the migration route bifurcates. Part of the swifts continue northeast between the Atlantic Ocean and the Appalachian Mountains, while the remainder pass through the valleys of the Hudson and Mohawk rivers into the drainage basin of the St. Lawrence River. Part of these latter migrants may use the Mississippi Flyway in the fall migration, but they nearly always use the Piedmont Flyway in the spring.

Stability of routes: Despite the fact that individual swifts show a tendency to use now the Mississippi and then the Piedmont Flyway, the great number of local returns (many returned several times) in both fall and spring clearly shows that as a population Chimney Swifts do adhere to definite migratory routes.

EXPLANATION TO PLATE 1

FIG. 1. Trap and cage in place on 60 chimney at the heating plant, University of Virginia.

FIG. 2. Cage being pulled to the top of the chimney with rope attached to the bottom to keep it from hitting the chimney.

FIG. 3. Same cage lowered to the roof and birds being removed for banding.

FIG. 4. Trap and cages in place on the University of Virginia Gymnasium, to show platform.

FIG. 5. Banding operations on the Baptist Church, Charlottesville, to show cover that induced the birds to stay in the top of the cage.

FIG. 6. Same cage, with cover lifted to show the effect of the cover.

Photographs by Dickinson

LITERATURE CITED

CALHOUN, JOHN B. 1938. Swift Banding at Nashville and Clarksville. *The Migrant*, 9: 77–81.

COFFEY, BEN B., JR. 1938. Swift Banding in the South. *The Migrant*, 9: 82–84.

GREEN, WYMAN R. 1940. Banding of Chimney Swifts (*Chaetura pelagica*) In the Region of Chattanooga, Tennessee. *Bird-Banding*, 11: 37–57.

PETERS, HAROLD S. 1937. Chimney Swift Banding in Alabama During the Fall of 1936. *Bird-Banding*, 8: 16–24.

POND, JOHN. 1940. A review of Green, 1940. *The Migrant*, 11: 38–44.

STODDARD, HERBERT L. 1926. Methods of Banding Chimney Swifts in the South. *Wilson Bulletin*, 38: 122–123.

WENZEL, WALTER. 1928. Uberwinternde Massen von *Chaetura pelagica* (L.) in Guatemala. *Ornith. Monatsber.*, 36: 76–77.

Department of Zoology, Northwestern University, Evanston, Illinois.
Department of Biology, University of Florida, Gainesville, Florida.

RETURNS FROM BANDED BIRDS: SOME LONGEVITY RECORDS OF WILD BIRDS

By MAY THACHER COOKE

(*Continued from page 37*)

GLAUCOUS-WINGED GULL. *Larus glaucescens*

*232820, banded at Mittlenatch Island, B. C., on July 25, 1925, by Theed Pearse, was found dead at Egmont, B. C., September 17, 1936.

WESTERN GULL. *Larus occidentalis*

*B645922, banded on South Farallon Island, near San Francisco, Calif., on August 17, 1933, by C. F. Smith, was found dead at Berkeley, Calif., April 3, 1938.

*B667040, banded at Cape Lookout, Oreg., on August 5, 1932, by Reed W. Ferris, was found dead at Kernville, Oreg., May 1, 1938.

HERRING GULL. *Larus argentatus*

*207898, banded at Hat Island, Mich., in July 1922, by W. S. McCrea, was found dead at Beaver Island, Mich., June 1939.

228724, banded at Grand Manan, New Brunswick, on September 1, 1925, by Ernest Joy, was found dead at Kings' Point, Great Neck, Nassau Co., N. Y., March 18, 1940.

*458——, banded probably at Little Gull Island, Mich., in July, 1926, by W. I. Lyon, was found dead at Frankfort, Mich., May 24, 1937.

*566784, banded at Gravelly Gull Island, Mich., on July 2, 1926, by W. I. Lyon, was found dead at Two Rivers, Wisconsin, September 7, 1940.

*564652, banded at Hog Island, Wis., on July 7, 1927, by W. I. Lyon, was killed at St. James Mission, Ont., about September 1, 1937.

*703367, banded at Monhegan, Maine, on June 29, 1930, by O. S. Pettingill, Jr., was found dead at Long Pond, Plymouth, Mass., on April 25, 1940.

*703556, banded at Hat Island, Wis., on June 30, 1928, by W. B. Grange, was shot on Hat Island, Wis., July 14, 1938.

*A720669, banded at Muskeget Island, Mass., on July 13, 1932, by J. A. Gillespie, was captured alive at Folkston, Ga., October 1, 1937.

*B610464, banded at Isles of Shoals, N. H., on July 18, 1932, by J. P. Melzer, was found frozen at Flushing, N. Y., March 17, 1938.

*B610932, banded at Isles of Shoals, N. H., on July 18, 1932, by J. P. Melzer, was found dead at Rockport, Mass., May 11, 1938.

*B613377, banded at Sister Island, Wis., on July 6, 1931, by H. C. Wilson, was found dead at Port Elgin, Ont., July 28, 1938.

*B613513, banded at Sister Island, Wis., on July 6, 1931, by H. C. Wilson, was found dead at Garden, Mich., August 13, 1938.

*B669648, banded at Big Gull Island, Mich., on July 8, 1932, by W. I. Lyon, was found dead at Sugar Isle, Mich., June 26, 1938.

*B657989, banded at Isles of Shoals, N. H., on July 18, 1932, by L. O. Shelley, was found dead at Bridgeport, Conn., December 4, 1938.

CALIFORNIA GULL. *Larus californicus*

*699889, banded at Gull Island, near Camrose, Alta., on June 28, 1928, by F. L. Farley, was found probably dead near St. Paul, Alta., about June 5, 1936.

RING-BILLED GULL. *Larus delawarensis*

*A602203, banded at Vermillion, S. Dak., on June 12, 1929, by W. H. Over, was found dead at Doyon, N. Dak., about June 18, 1937.

*A606406, banded at Kegashka River, Saguenay County, Que., on August 14, 1929, by H. F. Lewis, was found at Sheila, N. B., April 23, 1937.

B608489, banded at St. Martin's Shoal, Mich., on July 17, 1931, by W. I. Lyon, was caught in crow trap at Fremont, Ohio, about April 11, 1937.
B609125, banded at St. Martin's Shoal, Mich., on July 17, 1931, by W. I. Lyon, was found dead at Cedarville, Mich., August 8, 1938.

FRANKLIN'S GULL. *Larus pipixcan*

*A435450, banded near Mirror, Alta., on July 11, 1932, by Dr. J. E. Horning, was killed by flying into wires at Boonwell, Alta., June 20, 1937.

COMMON TERN. *Sterna hirundo*

*280991, banded at Chatham, Mass., on June 12, 1924, by Charles B. Floyd, was retrapped and rebanded with 36-304617 at Hyannis, Mass., June 26, 1936.
*433589, banded at Chatham, Mass., on July 6, 1926, by Charles B. Floyd, was rebanded with 36-334859 on June 7, 1937 and again recaptured at Chatham, Mass., July 3, 1939.
*551874, banded at Chatham, Mass., on July 6, 1927, by Charles B. Floyd, was recaptured and rebanded with 38-329372 at Chatham, Mass., June 7, 1939.
552615, banded at Chatham, Mass., on July 8, 1927, by Charles B. Floyd, was recaptured and rebanded with 37-331144, at Chatham, Mass., June 15, 1938.
*553222, banded at Chatham, Mass., on July 12, 1927, by Charles B. Floyd, was rebanded with 35-320954, on June 6, 1936 and again recaptured at Chatham, Mass., June 12, 1939.
*382193, banded at Chatham, Mass., on July 4, 1925, by Charles B. Floyd, was rebanded with 35-320658 on June 5, 1936 and again recaptured at Wellfleet, Mass., June 10, 1939.
A335287, banded at Billingsgate Island, Eastham, Mass., on July 2, 1929, by O. L. Austin, was captured on board ship at Pará, Brazil, January 16, 1939.
A335347, banded at Chatham, Mass., on July 5, 1929, by O. L. Austin, was recaptured and rebanded with 38-329134 at Chatham, Mass., on June 4, 1939.

ARCTIC TERN. *Sterna paradisaea*

*548286, banded at Red Island, Turnevik, Labrador, on July 23, 1928, by O. L. Austin, Jr., was collected as scientific specimen at same place July 30, 1938.
*550362, banded at Chatham, Mass., on July 3, 1927, by Charles B. Floyd, was recaptured at Chatham, Mass., June 16, 1937.
711780, banded at Penikese Island, Mass., in August, 1928, by L. B. Fletcher, was recaptured at Chatham, Mass., June 28, 1935.
A335164, banded at Truro, Mass., on June 25, 1929, by Charles B. Floyd, was recaptured at same place June 25, 1936.

ROSEATE TERN. *Sterna dougalli*

B310416, banded at Penikese Island, Mass., on July 10, 1931, by W. M. Tyler, was found dead at Milford, Conn., May 29, 1938.
*B351588, banded at Tern Island, Chatham, Mass., on June 23, 1933, by O. L. Austin, was found dead at Ellisville, Mass., July, 1939.
*34-324019, banded at Tern Island, Chatham, Mass., on July 1, 1934, by O. L. Austin, was retrapped June 3, 1940.

LEAST TERN. *Sterna antillarum*

*C137411, banded at Somer's Point, N. J., on June 21, 1932, by H. Buckalew, was found dead at Ocean City, N. J., May 29, 1938.

ROYAL TERN. *Thalasseus maximus*

*A516903, banded at Egg Bank, Beaufort County, S. C., on July 18, 1930, by E. M. Burton, was caught on fish line at Swansboro, N. C., September 15, 1936.

*A541210, banded at Cape Romain, Charleston Co., S. C., on July 15, 1932, by E. M. Burton, was found injured, died, at Hamer, S. C., August 15, 1940.
*A541913, banded at Cape Romain, S. C., on July 15, 1932, by E. M. Burton, was caught in fishing line at Charleston, S. C., July 3, 1939.
*A542074, banded at Cape Romain, S. C., on July 15, 1932, by E. M. Burton, was found with broken wing at Folkstone, N. C., December 20, 1938.
*A543341, banded at Cape Romain, S. C., on July 11, 1933, by E. M. Burton, was killed by car at Daytona Beach, Fla., January 28, 1939.

CASPIAN TERN. *Hydroprogne caspia*

*325945, banded at St. James, Mich., on July 21, 1924, by F. C. Lincoln, was shot at Pestagua Island, Magdelena Delta, Colombia, S. A., December 11, 1937.
*378411, banded at St. James, Mich., on July 19, 1925, by F. C. Lincoln, was found dead at Charlottesville, Va., about September 24, 1938.
*B608961, banded at Shoe Island, Little Hat, Mich., on July 18, 1931, by Wm. I. Lyon, was found sick or exhausted at Halifax, N. C., September 13, 1937.
*B608999, banded at Shoe Island, Lake Michigan, Mich., on July 18, 1931, by W. I. Lyon, was found at Limonar, Matanzas, Cuba, February 15, 1939.
*34-525080, banded at Shoe Island, Mich., on July 7, 1934, by F. E. Ludwig, was shot at Isla de Rondon, Magdelena River, near Soledad, Colombia, S. A., January 10, 1939.

(All locality names refer to the colony on Shoe or Little Hat Island, Beaver Islands, Lake Michigan.)

BLACK SKIMMER. *Rhynchops nigra*

A408567, banded at Stone Harbor, N. J., on August 5, 1934, by C. Brooke Worth, was found dead at Clearwater Beach, Fla., March 5, 1939.
*A423882, banded in Charleston Co., S. C., on June 30, 1930, by E. M. Burton, was found killed by automobile at New Smyrna Beach, Fla., February 8, 1940.
*A424241, banded at Egg Bank, St. Helena Sound, S. C., on July 10, 1930, by E. M. Burton, was killed for scientific specimen at Sea Island, Ga., February 16, 1939.
*A424332, banded at Egg Bank, St. Helena Sound, S. C., on July 10, 1930, by E. M. Burton, was found dead on beach at Boca Raton, Fla., February 5, 1940.
*A425166, banded in Charleston County, S. C., on July 6, 1931, by E. M. Burton, was found dead at same place July 22, 1937.
*A431859, banded near Savannah, Ga., on July 11, 1932, by I. R. Tomkins, was killed at Brunswick, Ga., September 22, 1938.
A434515, banded in Charleston County, S. C., on August 5, 1931, by E. M. Burton, was found dead at Stuart, Fla., February 28, 1940.
A450605, banded at Savannah, Ga., on July 22, 1932, by I. R. Tomkins, was found dead on Davis Causeway, Tampa Bay, Fla., April 24, 1938.
A450788, banded at Savannah, Ga., on August 1, 1932, by I. R. Tomkins, was found dead at Tampa, Fla., March 18, 1939.
*A519314, banded at Brigantine, N. J., on August 3, 1930, by J. A. Gillespie, was found dead at same place August 15, 1938.

ATLANTIC MURRE. *Uria aalge*

B616041, banded at St. Marys Island, Saguenay County, Que., on July 22, 1930, by H. F. Lewis, was retrapped and released with new band, No. 38-680942, at same place July 12, 1938.
B616039, banded at St. Marys Island, Saguenay County, Que., on June 30, 1931, by H. F. Lewis, was captured and released at same place July 8, 1937 and July 12, 1938.

B616042, B616043, and B616048, banded at St. Marys Island, Saguenay County, Que., on June 30, 1931, by H. F. Lewis, were captured and released at the same place July 8, 1937.

B616—, banded at St. Marys Island, Saguenay County, Que., on June 30, 1931 by H. F. Lewis, was captured and released with new band, No. 37-632026 at same place July 8, 1937.

MOURNING DOVE. *Zenaidura macroura*

10192, banded at Princeton, N. J., on May 2, 1927, by Mrs. A. N. Pack, was caught in automatic trap at Princeton, N. J., May 28, 1930 and found dead at same place May 7, 1933.

651000, banded at North Eastham, Mass., on August 21, 1932, by O. L. Austin, was retrapped April 7, 1937 and May 10, 1938, at the same place.

A423146, banded at Northville, S. Dak., on July 12, 1932, by J. F. Brenckle, was retrapped May 8, 1936 at the same place.

B382396, banded at Key West, Fla., on December 8, 1932, by W. W. Demeritt, was shot at Atmore, Ala., November 28, 1938.

GROUND DOVE. *Columbigallina passerina*

A393797, banded at Gulfport, Fla., on March 30, 1932, by Mrs. Daisie M. Morrison, was retrapped February 25, 1937, and June 6, 1937 at the same place.

A393801, banded at Gulfport, Fla., on May 11, 1932, by Mrs. Daisie M. Morrison, was retrapped June 20, 1937 at the same place.

BARN OWL. *Tyto alba pratincola*

*233524, banded at Chino, Calif., on May 24, 1925, by E. L. Sumner, Jr., was found dead at Compton, Calif., May 20, 1931.

*655302, banded at Escondido, Calif., on April 30, 1929, by Fred N. Gallup, was found at Temecula, Calif., August 31, 1936.

A694548, banded at Pomona, Calif., on November 6, 1930, by H. F. Koerber, was found killed by auto October 1, 1937, at Chino, Calif.

A712006, banded at Chino, Calif., on October 8, 1930, by H. F. Koerber, was found dead at Upland, Calif., October 1935.

A712042, banded at Chino, Calif., on July 26, 1931, by H. F. Koerber, was found dead near Chino, Calif., November 27, 1937.

SCREECH OWL. *Otus asio*

*226195, banded at Buena Park, Calif., on May 18, 1924, by John M. Robertson, was killed by a car at same place October 12, 1936.

A635789, banded at Wilmette, Ill., on January 9, 1931, by D. J. Davis, was caught in drain spout at Winnetka, Ill., about March 4, 1938, probably released.

CHIMNEY SWIFT. *Chaetura pelagica*

199067, banded at Thomasville, Ga., on April 12, 1927, by H. L. Stoddard, was captured at Choisy, Que., July 10, 1938.

492164, banded at Noblesville, Ind., on May 16, 1929, by Dr. Earl Brooks, was found dead at Oskaloosa, Iowa, about June 10, 1935.

A125815, banded at Thomasville, Ga., on August 2, 1929, by J. F. L'Hommedieu, was found dead at same place July 1936.

A51362, banded at Clayton, Ill., on September 21, 1929, by T. E. Musselman, came down chimney at Clayton, Ill., October 1938.

B124791, banded at Mount Berry, Ga., on October 12, 1930, by G. W. Bell, was found dead at South Charleston, Ohio, May 28, 1937.

C22775, banded at Quincy, Ill., on October 5, 1929, by T. E. Musselman, was trapped and released at Lexington, Mo., September 25, 1936.

C24941, banded at Chattanooga, Tenn., on September 21, 1929, by W. R. Green, was found with broken wing in Otsego County, N. Y., March 28, 1938.
C62157, banded at Chattanooga, Tenn., on September 30, 1930, by W. R. Green, was found at Uniontown, Ohio, about May 26, 1937. It also wore F50616, added in June, 1932, at Wadsworth, Ohio, by R. C. Richards.
C74446, banded at Cass Lake, Minn., on May 27, 1930, by O. L. Austin, Jr., was found dead in Beltrami County, Minn., June 16, 1937.
C75203, banded at Kingston, Ont., on June 7, 1930, by R. O. Merriman, was captured and released at same place June 1, 1937
C77613, banded at George School, Pa., on May 20, 1930, by John Bartram, was trapped and released at Tuskegee, Ala., October 9, 1936.
C150723, banded at Canal Winchester, Ohio, on September 23, 1932, by C. Conklin, was retrapped at same place September 29, 1938.
F5627, banded at Chattanooga, Tenn., on October 5, 1930, by W. R. Green, was trapped and released at Atlanta, Ga., October 11, 1936.
F10195, banded at Shoddy, Tenn., on September 28, 1930, by W. R. Green, was found dead at Rang Ste. Anne, Que., May 24, 1937.
H61141, banded at Memphis, Tenn., on October 10, 1933, by Ben B. Coffey, Jr., was trapped and released September 29, 1940 at the same place.
L17136, banded at Fairfield, Iowa, on May 13, 1933, by Carl Welty, was trapped and released at Nashville, Tenn., August 27, 1938.

FLICKER. *Colaptes auratus*

490801, banded at Sault Ste. Marie, Mich., on June 18, 1927, by M. J. Magee was found dead at same place November 15, 1938.

RED-BELLIED WOODPECKER. *Centurus carolinus*

B248081, banded at Avery Island, La., on May 14, 1933, by E. A. McIlhenny, was retrapped at same place March 8, 1935, April 17, 1935, and May 1, 1937.

HAIRY WOODPECKER. *Dryobates villosus*

463457, banded at Muscow, Sask., on March 20, 1927, by R. H. Carter, Jr., was retrapped and rebanded with 670279 at same place November 1, 1936.
588077, banded at Concord, N. H., on February 3, 1934, by F. B. White, was retrapped and released at same place November 27, 1938.

DOWNY WOODPECKER. *Dryobates pubescens*

A135801, banded at Athens, Ohio, on March 6, 1930, by Mrs. Marjorie Lee Guest, was retrapped at same place May 1, 1936.
A216078, banded at Ottawa, Ont., on December 12, 1931, by R. E. DeLury, was retrapped at same place April 17, 1933, May 13, 1934, April 11, 1935, August 1, 1935, April 6, 1936, May 24, 1937, and May 29, 1938. (See volume 8, 1937, p. 58.)
B71417, banded at Bar Harbor, Maine, on March 31, 1932, by Mrs. Effie A. Anthony, was retrapped at same place July 12, 1937, and July 4, 1938.
B139322, banded at Washington, D. C., on March 23, 1931, by John Molter, was retrapped at same place February 8, 1937.
B231726, banded at Amherst, Mass., on October 4, 1932, by Mrs. F. M. Cutler, was found dead at same place May 18, 1938.

(*To be continued*)

THE BROWN THRASHER AND THE TERRITORY THEORY

By ARETAS A. SAUNDERS

In the spring of 1923 I noted during early morning walks, that a Brown Thrasher (*Toxostoma rufum*) sang daily from a small tree along a roadside in Fairfield, Connecticut. The bird sang daily from April 27 to May 13. On the 14th, not hearing the song at first, I soon discovered the bird, in a tangle of weeds and blackberry almost directly beneath the singing tree. Another bird, evidently the female, was with him, and he was following her around on the ground, singing constantly, a song like the normal one in form, but so faint I could not have heard it, had I not been very close to the birds. After that time I no longer heard this bird in song, and did not see it, or its mate again till May 22, when I discovered the nest with four eggs, and a bird incubating them. The nest was in almost the exact spot where I had observed the courtship, and almost directly beneath the singing tree of late April and early May.

This is all in perfect accord with the territory theory. I have previously mentioned these facts (1929, pp. 38 and 46) to show that the belief that the Brown Thrasher does not sing near its nest, first stated, I believe, by John Burroughs, is not true. It is quite evident that the bird does not sing after it is mated, and while nesting, but in this instance it sang as close to the nesting site as other birds do.

In 1938, however, I made some more observations that surprised me, for they were quite different from the previous observation, and showed that, some of the time at least, Burroughs' statement is right. These new observations took place in the back yard of my former home.

In that yard there is a small hill, so steep and with soil so poor and rocky that it was impossible as either a garden or a lawn. When I first lived there, twenty years ago, there was one small Smooth Sumac on the hill. I allowed it to remain, and it spread by underground runners, until there was a thicket. I planted rambler roses and several shrubs and the thicket gradually increased in height and density. A succession of nesting birds took place with the years. When the thicket became fairly dense a pair of Song Sparrows (*Melospiza melodia*) nested in it. A few years later the Song Sparrows moved out and a pair of Catbirds (*Dumetella carolinensis*) took the place. The Catbirds nested there till 1938. That spring the male Catbird arrived and sang as usual, and a week or so later his mate arrived. On May 18, when the Catbirds were just beginning to gather nesting material, a pair of Brown Thrashers arrived rather suddenly, and at once took over the thicket and started nest-building. I saw no fighting between them and the Catbirds. The latter simply retired to a neighboring yard.

I had heard no thrasher song anywhere near my home, and I did

not hear it now. The birds had simply moved in from elsewhere after they had become mated. The nest was soon finished and the eggs laid. During the period of incubation I heard the male thrasher sing a few notes one day, but that was all the song I heard from the bird that summer. They produced a brood of young successfully, which left the nest on June 15. On June 17 they began a second nest. Incubation of the second set began on June 24, and on June 30 I left for summer work elsewhere and saw nothing more of the birds that year.

The following spring, 1939, the first thrasher of the year was seen on April 20, and on April 23 a male arrived at my thicket and began singing. He sang daily for some time thereafter. A male Catbird arrived early in May and sang from a neighboring yard. Then, on May 12, I noted a pair of Catbirds in the thicket, building a nest, while the thrasher, still mateless, had retired to a poplar tree across the street. Evidently a pair of Catbirds were too strong for a lone, mateless male thrasher. Two days later the thrasher ceased to sing and disappeared. Had he found a mate and gone elsewhere to nest, or did he try singing in a new and distant territory? Whatever happened the Catbirds' triumph was short, for before the nest was completed the female disappeared. Possibly she was the victim of a cat. The male, who had ceased singing when the nest-building began, resumed singing again, and sang continually for the rest of May and June. For the first time in years my thicket contained no completed birds' nest that summer.

I believe that both the Brown Thrasher and the Catbird are territorial in nesting behavior. But in this region the Catbird is extremely abundant, and the thrasher only fairly common. For Catbirds territory is scarce, but for thrashers it is abundant. Evidently a pair of thrashers can have their pick of territory, once they are mated, by simply taking that of Catbirds. So they often move elsewhere after the mate arrives, whereas Catbirds must stick to the territory they have selected.

So, it seems from this observation, that the male thrasher does not always select the nesting territory, but merely one to which it first attracts a mate by its singing. The nesting territory, in some cases at least, is selected after the mating has taken place, and then it would seem likely that the female would have more to do with the selection than her mate.

BIBLIOGRAPHY

HOWARD, H. E. 1920. Territory in Bird Life.

MOUSELEY, HENRY. 1921. Which Sex Selects the Nesting Locality? *Auk*, 38: 321-28.

SAUNDERS, A. A. 1929. Bird Song. *N. Y. State Museum Handbook* 7.

361 Crestwood Road, Fairfield, Connecticut.

TRAPPING THE SNOW BUNTING

BY OSCAR MCKINLEY BRYENS

BIRD banders who wish to trap the Snow Bunting (*Plectrophenax nivalis nivalis*) will not have much trouble in doing so, if they reside in a region containing the type of environment that this species frequents. I began banding birds in early summer in the year 1924, and during the few past winters up to that time, I had put out feed for birds, here where I now reside near McMillan in Luce County, Michigan. The Snow Bunting is one of the species that came to my feeding station, and when I began banding, it was one of the species that I most desired to trap. I failed to get any in my first winter (1924–25), and due to absence the next two winters, no trapping was done. I returned in the year 1927, but did not get any Snow Buntings, as I was not in a section that they frequent. In March, 1928 I returned from the western part of Luce County, to the old home where I have resided since, and have not missed a winter since then in getting at least some Snow Buntings.

The kind of place to select for a feeding station so as to attract the Snow Bunting, is open country. Farm lands are one of its favorite haunts, although it frequents open marshes, and I have seen them on lakes after they were frozen over, feeding on seeds of birches that the wind had blown from trees along the shore. Although I have attracted them to within twenty feet of the house and had some fairly good results during a season, better results may be obtained if the station is fifty or one hundred feet from buildings. At my trapping station here, I do not get as many within fifty feet from the buildings as I do at over fifty feet. A station may be near, or even in, an orchard. I have one station that is not over thirty feet from an orchard, and one that is by an apple tree at the east side of the orchard. All of my traps are operated off of the ground, except for a period from about March 1st, until the last of April, or first part of May, when I have one on the snow, or when no snow cover exists, on the ground. If possible, when establishing a station in, or near an orchard, it should be so arranged that when the bander goes to his traps, that the orchard (or most of it) will be on the opposite side. The reason for this is that the birds, fly to nearby trees instead of going somewhere out of sight when disturbed by my approach. Just before leaving, I put some feed at the station and it often happens that within a few minutes after I have left, that some, at least, have come back to the station that had flown to the trees.

The station may be on the snow, or on a stand or table. I prefer to have the station on a stand or table, rather than on the snow, as the feed does not become covered as much with snow. The table should be large enough so that it will be at least six inches wider all

around than the trap that is to be used on it. I have had better results with extra space around the trap, than if the trap covers nearly all of the table. The Snow Bunting feeds in flocks, and a larger area than that covered by the trap permits a greater number to feed there.

The kind of feed to use in attracting the Snow Bunting is much the same as with most species of birds that are trapped in winter. Oats, wheat, millet, cracked corn, buckwheat, and other grains, screenings from the threshing machine, hay chaff with clover, timothy and other seeds are among their favorites. I have found that suet, if cut in small particles will also form a part of their diet.

During the several winters that Snow Buntings had patronized my station, it appears that they do not come, until for some reason or another, the natural feeding conditions have become unfavorable. The Snow Bunting is an early riser; I have often heard them in the morning before it was light enough to see to read, and I have seen them at my stations at such times.

Although I have now given a list of the different grains and seeds that seem to me to be the most attractive to Snow Buntings, I feel that there is one point that should be mentioned regarding the manner of putting out feed to be the most attractive, and to be sure of winning them as customers at a station. Hay chaff will be of great assistance, even though there may be very few seeds in the chaff. Put other feed that is to be used, with the chaff, and put a handful or two on the top of the trap. Thus, with a trap on a stand and chaff on it, it serves to attract the Snow Buntings; then as the wind blows this feed off, it makes an attractive spot on the snow about the station, and very closely resembles bare ground.

I have trapped the Snow Bunting in funnel type traps, and also the Glenhaven 4-cell and other type trip-door traps. The funnel type (a Dodson Sparrow Trap) brings very good results, since captive birds are not frightened as they enter, as in some of the trip-doors but, of course, are not safe from enemies that can enter the funnel. In the thirteen winters that I have trapped Snow Buntings, two have been killed; each being in the funnel trap, and a Northern Shrike as the killer. It has always been my aim to get the birds as soon as possible after being trapped. Trapped birds do, at times, give notes of distress, and some of the others will return and hover above their captive comrades, and on some occasions leave the station for the rest of the day.

R. F. D. No. 1, McMillan, Luce County, Michigan.

INSTANCES OF THE SPRING MIGRATION OF THE BLUE JAY

BY HARRISON F. LEWIS

RECENT papers by Broun (1941) and Gill (1941) have described observations of the southward flight of Blue Jays (*Cyanocitta cristata*) in autumn. Gill, in the paper cited, has also presented evidence, derived from the records of banded birds, of a northward migration of this species in spring. Accounts of observations of Blue Jays in actual spring migration flight are not, however, included in these papers and appear to be uncommon in the literature, though Barrows (1912) and Eaton (1914), in their treatment of the Blue Jay's life history, make general statements about the spring migration that appear to be based on a number of individual observations. Under the circumstances, it appears desirable to place the following notes on record.

At 6.30 A.M. on May 11, 1937, just as I arrived at the southern tip of Fishing Point, which is the southernmost and southward-projecting point of Pelee Island, Ontario, in western Lake Erie, I heard a whistling sound caused by the passage of rapidly swooping birds through the air above me. On looking up, I saw about 25 Blue Jays, in two adjacent loose groups, hurtling down from a height without a cry. They disappeared into the woods on the point about half a mile north of my position. Apparently they had come from the islands or mainland south of Pelee Island. When I first saw them, they were at a height of 60 to 75 feet, but were descending rapidly.

When walking south through the woods on the point, prior to 6.30 A.M., I had not heard or seen any Blue Jays, but when walking north through the same woods, between 7.00 and 7.30 A.M., I heard two cry out. About 8.00 A.M., when I was in open farming country, about half a mile northeast of the wooded base of Fishing Point, a flock of about 26 silent Blue Jays, flying at a height of about 40 feet, overtook and passed me, heading northeast across Pelee Island. I think that it is probable that they were the same birds whose arrival on Fishing Point I had seen an hour and a half earlier.

The morning on which the observations above described were made was fine, calm, and sunny. The sky overhead was clear, but near the water there was sufficient mist to prevent my seeing Middle Island, about two miles distant. On Pelee Island at 7.00 A.M. the temperature was 50° F. and the barometric pressure 30.31 inches.

On the morning of May 8, 1941, I took my station at 5.01 A.M. at the rounded, partly wooded northeast point of Pelee Island, opposite Point Pelee, Ontario, to observe and record migration phenomena. The morning was clear and cool, with a brisk wind

from the west-southwest. At 6.09 A.M. a flock of about 55 Blue Jays (as nearly as I could count) rose into the air from a position 200 to 300 yards inland (on Pelee Island) from where I was observing. At a height of about 100 feet they hovered, heading into the wind (west-southwest) for a minute or two, during which time they drifted nearly sidewise until they were almost above me. Presumably their object was to go to the north shore of Lake Erie, which was in plain sight, even to me, seated on the ground. The nearest part of the north shore of the lake was the outer end of Point Pelee, about eight miles distant to the northeast, so that the wind was nearly fair for such a crossing. At the termination of a minute or two of hovering, as described above, the Blue Jays, however, descended again on Pelee Island at approximately the place from which they had risen.

At 7.32 A.M. this flock of Blue Jays repeated their previous performance, rising, hovering, and descending again where they had risen. Three minutes later, at 7.35 A.M., they rose into the air for the third time, the flock having increased to a total of about 75 birds, and, on reaching a height of about 100 feet, they left Pelee Island and flew directly northward, in which direction land was visible and about fourteen miles distant.

My continuous observation of migration ceased that day at 8.15 A.M., but at 8.55 A.M. I chanced to see another flock of Blue Jays, about 55 in number, fly northward from the northeast point of Pelee Island.

LITERATURE CITED

BARROWS, WALTER BRADFORD. 1912. Michigan Bird Life. Michigan Agricultural College.

BROUN, MAURICE. 1941. Migration of Blue Jays. *Auk*, 58: 262–263.

EATON, ELON HOWARD. 1914. Birds of New York. Memoir 12, Part 2, New York State Museum. Albany.

GILL, GEOFFREY. 1941. Notes on the Migration of Blue Jays. *Bird-Banding*, 12: 109–112.

Department of Mines and Resources, Ottawa, Ontario.

RETURNS AND SURVIVAL RATE OF WINTERING TREE SPARROWS

BY GEORGE J. WALLACE

TREE Sparrows (*Spizella arborea arborea*) arrive at Pleasant Valley Bird and Wild Flower Sanctuary, Lenox, Massachusetts, in great numbers in late October or early November, linger for two to three weeks, and then depart, leaving behind a small group of winter residents. Banding the fall transients, as might perhaps be expected, has yielded only negligible returns, an experience likewise applicable to the many migrants passing through in March and April; but the few strictly winter resident individuals repeat and return again and again

Of the eight Tree Sparrows wintering at the Sanctuary in 1937–38 seven were back the following year, a seemingly astonishing return percentage (87.5%) for a highly migratory species (slightly higher returns—90%—were secured that year for one flock of more or less sedentary chickadees). Seven newcomers eventually joined the oldtimers, raising the second winter's total population to fourteen, although three of the new ones were not noted until rather late (January 30, February 4 and 10) by which time two of the older birds seemed to have disappeared.

That such high returns (seven out of eight) may be somewhat exceptional is at least suggested by the significantly lower return figures for the two succeeding winters. In 1939–40 only five of the previous year's 14 returned (35.75%) and in 1940–41 only three out of nine (33.3%).

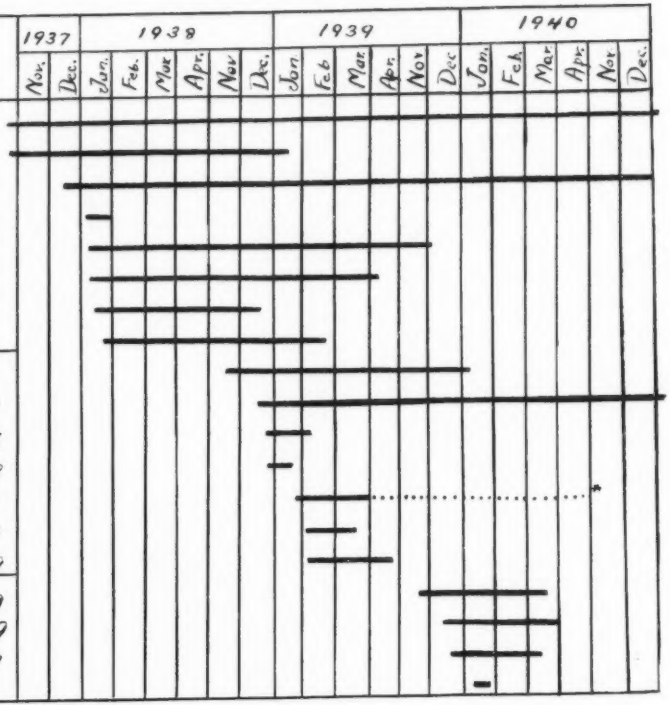
The accompanying chart, drawn by the Sanctuary hostess, Miss Helen Gay, graphically shows the return and survival rate of winter resident Tree Sparrows over a period of three years, from the end of 1937 through 1940. The small number banded (4) during the extremely severe winter of 1939–40 and the fact that none of them returned in 1940–41 has apparently not seriously altered the total population as the number of newcomers (7) seems to have built up the wintering group to its normal level.

One of the Tree Sparrows, banded here December 15, 1932 by S. Morris Pell and now in its ninth winter, is in the upper brackets of recorded age limits for this species. It has been a winter resident at least for the past four years, if not since the original banding date, the Sanctuary being a winter haven to which this individual unfailingly returns year after year.

Not included in the above accounts is F76454, banded here February 17, 1933 and retaken December 13, 1937. Though in the banding trap only a short time and not appearing unduly alarmed or injured in any way, this bird died in the hand without a struggle

RETURNS AND SURVIVAL OF WINTERING TREE SPARROWS 1937-40

Band Number	Date Banded
F. 96438	Dec 15, 1932
L. 73269	Apr. 10, 1936
38-132513	Dec. 16, 1937
38-132515	Jan. 8, 1938
38-132517	Jan. 9, 1938
38-132518	Jan. 10, 1938
38-132519	Jan. 13, 1938
38-132521	Jan. 20, 1938
39-122832	Nov. 23, 1938
39-122833	Dec. 19, 1938
39-122834	Dec. 23, 1938
39-122835	Dec 27, 1938
39-122838	Jan. 30, 1939
39-122839	Feb. 4, 1939
39-122840	Feb. 4, 1939
139-56971	Nov. 27, 1939
139-56972	Dec. 13, 1939
139-56973	Dec. 21, 1939
40-99601	Jan. 17, 1940



*Leg bone and band found May 4

when removed from the trap, the only instance of such an occurrence in the similar handling of hundreds of specimens. Subsequent dissection disclosed no trace of external or internal injury. The bird was an adult male, at least five and one-half years old.

Thus the Sanctuary's winter population of Tree Sparrows appears to be a relatively stable group, the same individuals returning year after year if survival permits, with losses in the ranks being filled by new individuals. They appear to be distinct from the hordes of spring and fall transients, which as far as banding evidence can disclose, rarely return via a Sanctuary route. The only apparent exception to the separateness of transients from the winter residents is of a bird banded March 29, 1939 and retaken two winters later on January 24, 1941. Otherwise, aside from an occasional February influx from unknown sources, the wintering group arrives in late fall and remains into April, forming a loose association whose individuals (unlike chickadees) apparently stray far and wide, often disappearing for days at a time, but eventually reappearing at the Sanctuary feeders, sometimes all together, more often as small separate segments of a larger wintering group.

Pleasant Valley Sanctuary, Lenox, Mass.

A TRAP FOR BANK SWALLOWS

By William A. Morris

Bank Swallows (*Riparia riparia riparia*) afford good opportunities for banding because they nest in colonies which frequently can be reached without much difficulty. However, banding large numbers of them by using hair nets or large traps let down from the edge of the bank is a tedious chore, and most of the birds escape. To overcome these disadvantages I have used individual traps consisting of cellophane bags attached to ends of cardboard tubes. These are placed at the entrance of the nesting holes, preferably just before dawn, before the birds have emerged.

The trap consists of three parts, namely, a cellophane bag, (two-pound size) a piece of thin cardboard about five by seven inches, and a small elastic band. The bags can be obtained at small cost from wholesale grocers. Cardboard of the thickness used for corn flakes boxes works well because it can be rolled into a tube without cracking. It can be obtained at paper box factories in pieces about five feet square for practically nothing and cut into the desired size. The elastic bands should be small, about the size of the thumb nail.

To assemble the trap roll a piece of the cardboard into a tube seven inches long and about two inches in diameter. Insert this into the mouth of the bag about three inches. Now fasten the bag to the tube with an elastic band. If too tight a band is used the opening of the tube may become too constricted for a swallow to pass. On the other hand, if too loose a band is used the bag will

slip off the tube when a bird enters it. Before placing the trap inflate the bag so as to permit an unobstructed entrance to it for the birds.

To operate the trap insert the tube into the mouth of the burrow a few inches. The tendency of the unbound end of the tube to uncurl holds it securely against the walls of the tunnel. If the cellophane bags are to be used more than once a tablespoonful of sawdust, to absorb the excrement, should be put in them. A bag can be used about a half a dozen times before the seams give out.

Although these traps may be used with some success in the daytime, best results are obtained if they are placed during the hours of darkness, when all of the birds are in the burrows. Because moisture weakens the traps, it is best to set them shortly before dawn rather than in the evening. A focussing flashlight is essential, and a short ladder often useful. Before placing a trap the tunnel should be examined to ascertain that birds are in it. Caution must be exercised here, as some of the birds attempt to escape as soon as the light is flashed on them. Quiet is imperative, for the swallows are easily aroused and will leave their burrows in spite of darkness. Once in the air they quickly arouse the rest of the colony by their cries.

The number of birds in a burrow may vary from one to ten. Those which do not emerge immediately do so at daybreak. Traps should be emptied as soon as the birds cease emerging. A few birds refuse to emerge with the rest. Some of these laggards can be aroused by shining a bright light on them, either from a flashlight or by mirrored sunlight. The traps containing several birds should be emptied first because of the danger of injury and suffocation. If a large number of traps have been set, it is wise to start collecting from those which were placed first, as the birds in some of them may have been confined longer than those in the traps set later.

As each trap is emptied it should be disassembled. The cellophane bag requires the greatest care. No attempt should be made to stack or fold the bags until they are dry, for if they are packed damp they will mould and become useless.

The results of one morning's operations with this equipment will indicate its efficiency. On July 1, 1941, ninety-five traps were set. These had been assembled and stored in a cardboard box the previous night. Bands also had been opened in advance. With the aid of three helpers all traps were in place within an hour after reaching the colony, and about a quarter of an hour before dawn. Tunnels were examined and the traps placed by one person on a short ladder with assistants below who passed up the equipment to him. The catch amounted to 189 birds. Banding was completed and the traps disassembled before six o'clock. The time spent at the colony was about three hours.

796 Elias Street, London, Ontario, Canada.

GENERAL NOTES

Another Slate-colored Junco at Least Eight Years Old. On January 21, 1932, Arthur Milliken banded a male Slate-colored Junco (*Junco hyemalis hyemalis*) F76206 at Brooks School, North Andover, Massachusetts. The age of the bird when taken is not indicated in his records. This Junco repeated on January 23, February 4, and March 29, 1932. It returned on December 5, 1935, and repeated on March 5, 1936. No banding was done at North Andover in 1937 and 1938.

I had this bird as a return on October 29, 1939, at Brooks School. It repeated on December 8, 1939, and on February 12, 19, and 21, 1940. I have not seen the bird since it last repeated. The date of banding together with the date of its last recapture indicates that this Junco was in at least its ninth year. Smiley, *Bird-Banding*, 1939, 10: 161) has reported another Slate-colored Junco which was at least eight years of age, a bird which he believes may have been a summer resident at Mohonk Lake, New York. Juncos are winter residents only in North Andover.—Oscar M. Root, Brooks School, North Andover, Massachusetts.

A Life History is Completed. On page 174 in the October, 1940, issue of *Bird-Banding* was reported the simultaneous capture of three return White-throated Sparrows (*Zonotrichia albicollis*) in a Government sparrow trap. This interesting event occurred on July 6, 1939 in Millbridge, Maine, the three birds having been banded in the same locality the previous summer. Of these three birds, only 138-100527, a strikingly marked male, returned for the summer of 1940. He was recaptured as a Return-2 on July 3, 1940 in the same trap set in the same location. He made frequent visits to the trap during the summer and was retaken nineteen times. It is needless to say that when I returned to Millbridge for the summer just past, the possibility of the return of this bird was a fond anticipation. But when late June had passed and July was waning without his having reappeared I felt certain that his life's history would have to be closed with a question mark.

Then came July 30, 1941. It was just before six o'clock in the morning when I approached the Government sparrow trap set in the familiar little clearing among the spruces and firs which hid it quite completely. The sound of a metallic rattling told me that something was in the trap, and stepping into the clearing, I discovered a red squirrel in the rear compartment. It was not until I stooped to open the door which would release the trespassing squirrel that I noticed the almost shapeless little bunch of brown feathers crumpled into one corner of the same compartment. Even as my attention was arrested the bird's body rolled ever so slightly onto one side and one leg extended itself slowly, trembled, and became still. But on the leg, extended in that dying movement as if for my inspection, was an aluminum band.

When the squirrel had been driven from the trap I retrieved the body. It was the mutilated form of a White-throated Sparrow. Many of its body-feathers were loosened and its tail-feathers were entirely gone. The top of its head was partly scalped and bleeding, but the yellow line before each eye was brilliant, nor ever was there a purer white than the white beneath its throat.

To read the number on the band was superfluous. I had handled that bird too many times to have failed to recognize him. The band merely sufficed to prove that my recognition was correct. No. 138-100527 had returned to me again. How much easier to have closed his life's history with a question mark than to have to record this sad ending.—G. Hapgood Parks, 99 Warrenton Ave., Hartford, Connecticut.

RECENT LITERATURE

Reviews by Margaret M. Nice

BANDING

1. Some Tagging Experiments with Black-footed Albatrosses. Loye Miller. 1942. *Condor*, 44: 3–9. Twenty-five *Diomedea nigripes* were marked at sea off the coast of southern California; they were attracted by bacon fat and were marked by sprinkling paint on their backs. Twelve repeated at 20 miles, seven at 30 miles, three at 40 miles and one at 50 and 60 miles. The paint was repugnant to them, evidently being recognized by odor. Sometimes the marked birds followed the ship, at other times they did not arrive till 30–60 minutes after the ship had stopped. "There seemed to be some communicable interest transmitted by some means not entirely clear to us."

2. Further Data from the Elmhurst, Long Island, Bird-Banding Station. Marie V. Beals and J. T. Nichols. 1941. *Birds of Long Island*, No. 4: 88–114. A transient Brown Thrasher (*Toxostoma rufum*) was retaken in Georgia, another in Texas. Of 1609 Juncos (*Junco hyemalis*) banded from 1928–1939, *none were retaken* at Elmhurst, but three were taken in Georgia and South Carolina and one in Indiana—Nov. 8, 1933, having been banded Nov. 2, 1932. Ten per cent (31) of the 313 Tree Sparrows (*Spizella arborea*) returned. Of 7,268 White-throats (*Zonotrichia albicollis*) eight returned, and twelve were recovered from Maryland to Georgia.

3. A Kittiwake Gull (*Rissa tridactyla*) Banded Near Murmansk, USSR., Recovered in Newfoundland. Hoyes Lloyd. 1941. *Canadian Field-Naturalist*, 55: 138. Banded on July 25, 1938, it was captured in the autumn of 1939. This is at least the third record of Russian-banded Kittiwakes being taken in Newfoundland.

Banding was used in Nos. 5, 17, 20, 44, and 53.

MIGRATION

5. Migration in Pacific Coast White-crowned Sparrows. Barbara D. Blanchard. 1942. *Auk*, 59: 47–63. Valuable histological, physiological, and behavior studies on intermediate populations of *Zonotrichia leucophrys*, in amplification of the author's admirable study on the definitely sedentary population of *nuttalli* at Berkeley, California, and the migratory *pugetensis* wintering at Berkeley and breeding at Puget Sound, (see No. 53). Studies at three intermediate points showed great variations in gonad size, amount of fat, stage of molt, and flocking and territorial behavior.

6. The Spring Migration of the Red-backed Shrike over Europe. H. N. Southern. 1941. *British Birds*, 35: 114–119. The fifth paper in this series maps the migration of *Lanius collurio*, showing its late arrival and rapid spread, as well as its avoidance of large bodies of water.

LONGEVITY

7. Duration of Life of Arctic Skua. Chas. Oldham. 1941. *British Birds*, 35: 160. A Parasitic Jaeger (*Stercorarius parasiticus*), "believed to be a female" and "identified by its small size and great tameness", returned *for* 31 *years* to the Isle of Foula, but finally "met with an accident and was found dead with a broken wing near its nest. Its partner continued to incubate the eggs, but after a week it secured another mate."

LIFE HISTORY

8. Aggressive Incidents Relative to Marsh Hawks. J. J. Elliott. 1941.

Proc. Linn. Soc. N. Y., 52–53: 127–128. A *Circus hudsonius* with several primaries clipped by gunshot hunted over the same area all winter; it attacked intruding hawks of other species. Once a Marsh Hawk flew at a Rough-legged Hawk (*Buteo lagopus s. johannis*) with a harsh cry; the latter out-flew it, and later the birds came to tolerate each other. Two Duck Hawks (*Falco peregrinus anatum*) drove off a Marsh Hawk; often, however, these falcons leave the vicinity upon the approach of the harrier.

9. Feeding Behavior of a Harrassed Duck Hawk. R. A. Herbert and J. J. Hickey. 1941. *Proc. Linn. Soc. N. Y.*, 52–53: 128–129. A Duck Hawk captured a shorebird and started to eat it on the grass, but a young Marsh Hawk tried three times to drop on the Duck Hawk. The falcon ascended in circles and ate its prey in the air.

10. Attwater's Prairie Chicken. Its Life History and Management. V. W. Lehmann. 1941. *Fish and Wildlife Serv., No. Am. Fauna*, 57: 1–65. 40 cents. *Tympanuchus cupido attwateri* used to be exceedingly abundant in the coastal prairie section of Texas; now due to mercileess slaughter and to destruction of its habitat, probably less than one per cent of its former numbers remain. In 1937 there were about 8,700 birds. Booming of the males starts in February, and laying in late March and early April. Twelve eggs are laid; early nests are more successful than re-nestings. Broods dwindle from 11 to 5 in the first four weeks. Adults do not have a highly developed rallying call, and the young get lost. Two chicks, 2–3 weeks old, were seen with two molting males. The young leave their mother at about six weeks. If the increase in one nesting season reaches 100 per cent, that is very good. Heavy rainfall in May is disastrous. Management recommendations are made and the setting aside of ample reservations urged to prevent extermination.

11. Successful Breeding of the White-necked Crane. (Erfolgreiche Zucht von Weissnackenkranichen (*Grus leucauchen*).) L. Hagenbeck. 1940. *Journal für Ornithologie*, 88: 348–354. A pair brought from Japan to Germany in 1933 raised two young in 1933, one each year in 1935, 1936 and 1937, four in 1938 and two in 1939. The female incubates during the day, and the male at night. They attack all visitors but their keepers, the male being especially pugnacious. The young get their growth and feathering in five and one-half months, but the voice does not change until the next spring.

12. The Black-headed Gull in the City Limits of Zurich. (Die Lachmöve (*Larus r. ridibundus*) L.) im Stadtgebiet von Zürich, besonders im Sihlgebiet, Winter 1940–41). W. Epprecht. 1941. *Ornithologische Beobachter*, 38: 95–113. An account of the movements, morning and night, of the different flocks of gulls in the winter of 1940–41. When the weather is above freezing the gulls stand on stones or walls; if these are snow-covered, they stand in the water; at 2° below freezing they stand on one foot on the ice, while at lower temperatures they lie on the ice.

13. Mourning Dove Production in Southeastern Iowa. H. E. McClure. 1942. *Auk*, 59: 64–75. On 220 acres 1,108 nests of *Zenaidura macroura* were built in 1938 and 1443 in 1939; 1,464 nestings were attempted in 1938 and 1,975 in 1939. The first year there were 250 pairs and the second year 330. Each pair averaged 5.85 nesting attempts in 1938 and 5.98 in 1939. Nesting started April 16, 1938, and on March 23, 1939; the last young left Oct. 15, 1938 and Oct. 11, 1939. Thus the nesting season lasted 183 days in 1938 and 203 in 1939. "Winds and heavy storms are the greatest decimating factors of nests, eggs and young", p. 66. In 1938 1,502 young left, in 1939 1,583. In 1938, 220 young were killed, and 275 in 1939. Of more than 6,300 eggs that were laid, 48 per cent produced successful young. The average of 1.83 young were raised to a successful nest. In ten cases four broods were raised in a nest. A paper that represents a vast amount of work.

14. Possible Homosexual Mating of the Rock Dove. Hervey Brackbill. 1941. *Auk*, 58: 581. In two pairs of feral pairs mates trod each other.

15. The Feeding Interval in the Hoopoe. G. K. Yeates. 1941. *British Birds*, 35: 108–109. In Provence a male *Upupa e. epops* fed his incubating mate about three times an hour; he might come every ten minutes and rarely stayed away for forty. When he did, the female gave harsh notes like the begging notes of young Green Woodpeckers.

16. Skylark Singing Continuously for eighteen Minutes. H. G. Alexander. 1941. *British Birds*, 35: 160. It is very unusual for *Alauda arvensis* to give a "completely uninterrupted song lasting much over five minutes."

17. Life History Studies of the Tree Swallow. Richard G. Kuerzi. 1941. *Proc. Linn. Soc. N. Y.*, 52–53: 1–52. Fine account of a three-year study of a colony of *Iridoprocne bicolor* in Kent, Conn. Boxes were erected in a favorable place by a river; ten pairs nested in 1937, 23 pairs in 1938 and 35 in 1939. (There were 30 pairs in 1940 after the severe winter in the South, but 50 in 1940.) There were 65 pairs of birds nesting on three and one-quarter acres. The swallows arrive in a small band about April 8; immature females (known by their plumage) come in late April; in mid-May there is a secondary flight made up of 40 per cent of immature females. (The male gets his mature plumage at less than one year.) These cause considerable disturbance; they may be non-breeders or may settle in a more northerly location. There is a mass departure from the colony on cloudy days, even though eggs are partly incubated, but the eggs do not seem to be adversely affected. Cooper's Hawks are attacked by the colony (p. 11).

Territory is restricted to the nest-box; both sexes fight for boxes, occasionally killing each other. They pay no attention to Barn, Bank and Rough-winged Swallows, but a female Purple Martin was set upon by the whole colony. There was competition between the Tree Swallows and Bluebirds. The mating call and note used when attacking the observer sounded the same; in both cases the bird is descending. Both birds build the nest. "Mature females were more efficient in nest-building than one-year-old birds" (p. 50). Nests of the latter were more fully lined with feathers than those of the former. Copulation takes place five and six days before the first egg is laid. Temperature, humidity and possible sunshine relations with egg-laying are discussed and the suggestion made that "the first egg is probably laid 6 days after the mean temperature of three successive days was 55.3° F., and the threshold decreased about 0.6° F. each day thereafter" (p. 23). However, in 1941, despite abnormally high temperatures in April and May, the Tree Swallows' first egg was laid May 6, corresponding exactly with the average of 1937–39. "On the other hand the Bluebird did respond to the higher temperatures, by laying its first egg on April 13, the previous earliest date in this study being April 21" (p. 48). It may well be that Bluebirds and Song Sparrows, both early nesters, are markedly affected by temperature in starting to lay, whereas with species that nest later, temperature makes little difference.

The age of banded birds at first laying ranged from 344–354 days. Normally the female does all the incubating, but in one case where the female died after three days of incubation, the male took over incubation and raised the young (p. 27). A few hours' observation on incubation rhythm showed an average of 10.9 minutes on the nest and 9.3 minutes off (p. 29). [The figure on p. 50 of nineteen minutes on the nest is a misprint.] Six to seven days elapsed between the loss of one set and the first egg of the second, except in three cases of subnormal temperature, when 8, 11 and 11 days intervened. The incubation period lasted 13 to 16 days, the average being 14.5 days.

The fledging period lasted 15–24 days, 18–20 days being usual. The average number of young raised per nest was 4.5. "Except for the first few days after the young hatch, the normal or average number of visits by both parents was approxi-

mately one visit every two minutes" (p. 33). Eight hours' observation on four nests showed that with a pair known to be first year birds, the male made seven visits to each one made by his mate; with a pair where the female was first year, the male's age unknown, he made three times as many visits as she; where the female was probably two years old she and the male fed equally; while a fully adult female outdid her mate.

Within a day or two of the fledglings' leaving, the adults definitely attempted to coax them out; they could be seen flying to the boxes without any visible food. "The adult would perch at the opening for a moment, flutter off, and then return" (p. 34). One fledgling flew a mile at the first attempt! Reproductive efficiency was excellent, for 72.1 per cent of the eggs laid resulted in fledged young. Ten per cent of the eggs were destroyed, probably by Tree Swallows. The reproductive efficiency of ten pairs in which one or both birds were fledgling returns was fully as high as that of the rest of the colony, 75 per cent. (The reproductive efficiency of 211 House Wren eggs was 55.9 per cent; that of 33 Bluebird eggs 51.5 per cent.) In 1938 108 fledglings were banded; of these eleven returned the following year—10.4 per cent. Five were males, six females. Twenty-seven per cent of banded adults returned. Plumage changes in banded fledglings are discussed. A well-planned and well-executed study, giving a wealth of information including comparisons with other studies.

18. Three Long-tailed Tits Feeding One Brood. J. A. Gibbs. 1941. *British Birds*, 35: 59. Three adult *Aegithalos caudatus rosaceus* were feeding eight young in the nest. At least six previous records of three adults at one nest and three records of four adults were given in *British Birds*, vol. 29, p. 80; since then there have been other records.

19. Nesting of the Long-tailed Tit. (Brut der Schwanzmeise (*Aegithalos caudatus*). W. Vogt. 1941. *Ornithologische Beobachter*, 38: 137–139. A pair was watched at intervals while the female incubated. After the young hatched, a handsome male assisted in feeding the young and cleaning the nest. A fourth Titmouse entered the home tree and was driven off by the father of the family.

20. An Instance of Mockingbird Bigamy. Amelia R. Laskey. 1941. *Migrant*, 12: 65–67. A male *Mimus polyglottos* banded in September 1936 remained continuously on Mrs. Laskey's grounds through 1939; in this year he had two mates incubating eggs simultaneously 80 yards apart. Apparently the territory was divided between the two females. The second female lost her eggs and disappeared.

21. The Cowbird at the Nest. Harry W. Hann. 1941. *Wilson Bull.*, 53: 211–221. Three photographs were obtained as the result of great patience and persistence; two show a female *Molothrus ater* in Ovenbird's nests, and one taking an egg from an Ovenbird's nest. The female finds nests by watching the bird building; she watches intently, and "this doubtless stimulates the development of the eggs, which are laid four or five days later" (p. 220). She makes "regular trips of inspection to nests during the absence of the owners." She spends from a few seconds to a minute in the nest when laying; she comes very early, 27 minutes before sunrise on the cloudy morning of May 20. Eggs are removed 85 per cent of the times that eggs are laid; they are taken the day before or day after the egg is laid.

22. The Cowbird. F. M. Jones. 1941. *Oölogist*, 58: 117. Eight distinctive pea-green Cowbird eggs were found in West Virginia from May 5 to June 18, the last egg at this date being "incubated 3 days." The author considers that the bird must have laid over twenty eggs. The evidence, however, can be interpreted as showing three clutches, the first from May 5–10, the second including May 18, the last ending about June 15. This agrees with my findings in Ohio (1937: 155).

23. The Number of Eggs Laid by Cowbirds. David E. Davis. 1942. *Condor*, 44: 10–12. A study of the sectioned ovaries of eleven individuals of *Molothrus bonariensis* and one each of *M. rufo-axillaris* and *Agelaioides badius* gave evidence that these birds lay eggs in clutches of 4–5 eggs. It is suggested that my data (*Trans. Linn. Soc. N. Y.* 4, 1937) might be interpreted to indicate that, instead of sets of 5–6 eggs at intervals of 6–12 days, sets might consist of only five eggs at intervals as short as three days. I still prefer my interpretation. Further observations in the field and in the laboratory are needed.

24. Analysis of Losses in the Nesting of Birds. S. C. Kendeigh. 1942. *Journ. Wildlife Management*, 6: 19–26. A vast amount of data from the fifteen acres of Dr. Baldwin's country home at Gates Mills, Ohio; the outcome of 2,725 nesting attempts of 51 species of birds from 1921–1939. An abundance of nest boxes was constructed; cats, red squirrels and black snakes were controlled. Success was high, but it is impossible to compare it with other studies, since nowhere are the *total number of eggs laid and total number of young fledged given*, from which the percentage of "reproductive efficiency" can be obtained. In Table 4 the percentages are given, but not the numbers; for birds with open nests these run from 29 to 58 per cent, but without the numbers we cannot judge whether the average would be more or less than 43 per cent found in the six studies involving 1,994 eggs reported in *Trans. Linn. Soc. N. Y.* IV, Table XVII. Upon my request Dr. Kendeigh sent the total number of eggs laid by sixteen species, ranging from nineteen with Cardinals to 6,763 in House Wrens. "The number of young fledged in all successful and unsuccessful nests may be calculated from columns 1 and 4 in Table 4." Using these figures and calculating the number of young leaving the nests, it was found that from 2,033 eggs of nine passerine species in open nests 964 young were fledged, or 47.7 per cent reproductive efficiency. If 122 eggs of Mourning Doves and Chimney Swifts are added, reproductive efficiency for 2,155 eggs in open nests of eleven species of altricial birds come to 46.9 per cent.

As to the five hole-nesting species, 5,561 young were fledged from 7,429 eggs, 74.8 per cent of success. Both these figures of reproductive success are somewhat high, due perhaps to the elimination of the worst natural enemies. With House Wrens 89 per cent of the nestings of the first brood were successful, and 80 per cent of the second. In House Wren nests the average daily rate of loss was 2.4 per cent during nest building, 2.2 during egg laying, 1.2 during incubation, and 0.5 during nestling life. A higher percentage of infertile and addled eggs were found with the House Wren when laid at temperatures below 58° F. and above 70° F. In successful nests, at medial air temperatures from 5.3± 1.6 eggs failed to hatch; at higher and lower temperatures, from 8.5± 3.4 to 8.9± 4.4.

No. 53 is an outstanding life history study.

TERRITORY

25. The Role of Territory in Bird Life. M. M. Nice. 1941. *American Midland Naturalist*, 26: 441–487. A history of the theory of territory is given from 1622 to the present time. Altum in 1868 presented the theory in detail, but his work was unknown outside of Germany. In 1920, Howard with "Territory in Bird Life" brought the matter to the attention of the ornithological world. Of the titles included in the bibliography 34 appeared before the publication of this book and 344 since then.

Six types of territory are distinguished: mating, nesting and feeding ground; mating and nesting, but not feeding ground; mating station only; restricted to narrow surroundings of nest; winter territory; roosting territory. These types are not rigid; some birds belong to one type in one place and to another in another; some birds are difficult to assign to a type. "With such a broad concept of territory, non-territorial birds are rare, the Cowbird and some Parakeets being our chief examples."

"Territorial behavior is based primarily on a positive reaction to a particular place and a negative reaction to other individuals. Conditioning to an area puts an animal into the best stimulus situation; the support from the familiarity of the environment enables it to be dominant there. In the case of the nesting territory, the male's fighting reactions are intensified through his instinct to protect his mate, nest and young. Territory serves as a device for regulating despotism and a safeguard against interference in the nesting cycle. It also serves in many cases to bring the sexes together and to assist in the formation of sexual bonds."

26. Red-wing Observations of 1940. Ernst Mayr. 1941. *Proc. Linn. Soc. N. Y.*, 52–53: 75–83. Observations of territory establishment and defence by *Agelaius phoeniceus* in several swamps. Two of three males were polygamous. Contrary to Darling's hypothesis that "on account of mutual stimulation, breeding starts earlier in larger colonies than in smaller ones", it was found that laying "started earlier in several smaller colonies than in a large one", because of ecological conditions. In territorial encounters driving away was effected by "threatening postures (with showing of the red shoulder patches)" (p. 79).

27. Birds and Their Reflections. K. A. Hindwood. 1941. *Proc. Roy. Soc. N. S. Wales*, 1940–41: 20–29. Instances of birds, mostly Australian, attacking their reflections, in particular male and female Blue Wren (*Malurus cyaneus*) and Magpie Lark (*Grallina cyanoleuca*). A male Grey Thrush (*Colluricincla harmonica*) brought "butter, insects, crumbs and brightly-colored petals" to his image. "He mates normally and brings his mate to witness the show, but she has never shown any great interest." The sexes differ in bill color, and somewhat in coloring of the underparts, but the male's behavior was apparently courtship in contrast to the territorial animosity usually shown. Some birds died from their mistaken jealousy. Interesting pictures are shown of the species mentioned above.

See Nos. 17, 20, 34 and 53 for other references to territory.

BIRD BEHAVIOR

28. The Fishing Activities of Double-crested Cormorants on San Francisco Bay. Geo. A. Bartholomew, Jr. 1942. *Condor*, 44: 13–21. Interesting article based on detailed observation of fishing technique of *Phalacrocorax auritus*, especially in the large flocks where the birds form a long narrow line at right angles to their movements. They swim rapidly, dive to get fish, and fly to catch up again. In small flocks, the manner of fishing is different; swimming is slower, and instead of a line, the birds form a circle.

29. Studies on the Flock Organization of the White-throated Sparrow, *Zonotrichia albicollis*. J. P. Wessel and W. H. Leigh. 1941. *Wilson Bulletin*, 53: 223–230. The most aggressive bird was a female. In other groups males were sometimes top birds, in one this was true of a female and in another of a single-testis bird. In all groups the bottom bird was a female. "In general there is a correlation between position in the social order and time of feeding and bathing. The alpha birds generally feed first. In none of the experiments did the low birds bathe at any time during the observations." They remembered each other after absences of eleven and seventeen days. Peck-right was found in flocks of 3, 5 and 6 birds. There were two triangles in the six bird flock.

30. Honeyeater and Ants. P. A. Bourke. 1941. *Emu*, 41: 163–164. A Lewin Honeyeater (*Meliphaga lewini*) picked up large ants (*Campanotus*), held them a second or two, placed them under its wings and ate them. A Rufous Whistler (*Pachycephala rufiventris*) anted, but dropped the ants to the ground.

31. Roosting Habits of the Chesnut-backed Chickadee and the Bewick Wren. Laidlaw Williams. 1941. *Condor*, 43: 274–285. A total of 135 observa-

tions were made from June 28, 1940 to March 31, 1941 at five roosting places of *Penthestes rufescens* and three of *Thryomanes bewicki;* photographs are given of sleeping birds and roosting sites. "All the chickadee roosts were close under the eaves of buildings." A female's roosting time averaged 21.5 minutes before sunset, some ten minutes before that of her mate. (These birds were paired in November, started building March 9, the female first roosted in the nest box on March 18 and laid the first egg March 24.) The wrens roosted on the sides of buildings and underneath "a canopy of fallen dead needles on a Monterey pine bough." The average time of a female wren's roosting was about sunset, while that of a male was 12.3 minutes after sunset. Males of both species accompanied their mates to their roosts, then left to roost elsewhere. The wrens gave harsh "territorial" notes before going to roost, although no other birds were present. Light measurements were made in candles per square foot by a Weston Model 650 Universal Exposure Meter directed "as nearly toward the zenith as possible as standard reading places where the light from the sky was unobstructed" (p. 274). It was found "that the birds tended to come to roost at somewhat higher light intensities in rainy weather" (p. 284).

32. Some Observations on Roosting Birds. M. H. Dunsheath and C. C. Doncaster. 1941. *British Birds*, 35: 138–148. Observations on roosting places, manner of roosting, height of the roost, and wakefulness of a number of common species. Sometimes several Wrens (*Troglodytes t. troglodytes*) were found roosting together, once as many as nine being found in an old Song Thrush's nest only an inch below the tile roof of a farm building.

33. The Instinctive Nature of Nest Sanitation. Stuart Smith. 1941. *British Birds*, 35: 120–124. When the author opened up a Yellow Wagtail's (*Motacilla flava flavissima*) nest for photographic purposes, the male parent picked up and carried away small balls of lime within a foot of the nest. A description is given of various parent birds prodding the young "to induce defecation", and also tugging at down on the nestlings' back.

34. Habitat Selection Among Higher Vertebrates and its Relation to Intraspecific Variation. Alden H. Miller. 1942. *American Naturalist*, 76: 25–35. Habitat selection "might appropriately be called perception of adequate environment" (p. 29). It depends on an "automatic, instinctive reaction . . . to a few key aspects of the environment." Olive-sided Flycatchers (*Nuttallornis mesoleucus*) normally nest on the Pacific coast in "forests of tall, fairly open coniferous trees"; recently they have "invaded the plantings of tall eucalyptus in the cool coastal belt"; apparently here the key aspect was the height of the trees. "This instinct is just as much a part of the vital equipment of the species as a structural adaptation."

"Song Sparrows have broken up into about 28 races on the North American continent, whereas Lincoln's Sparrows [of the same genus] have divided into but three. The Lincoln's Sparrow, apparently through habitat selection, adheres to a more sharply circumscribed environment than do the Song Sparrows, whose selecting instincts have permitted pioneering of somewhat diverse situations, thus opening up to the species new geographic areas and new possibilities of adaptational adjustment. Establishment of numerous geographically and ecologically isolated colonies of the Lincoln Sparrow has been thwarted by the rigid adherence to a certain type of fresh-water marsh" (p. 33).

Habitat selection involves learning as well as instinct. "Habits and associations with respect to environments and particular landmarks are passed on non-genetically from generation to generation. Cultures or societies are formed in higher vertebrates, as indeed in humans, and temporary barriers are set up." In the case of corvids, "Instinctive is the tendency towards gregariousness and returning to familiar habitats and roosts, but the particular societies and roosts to which each group is limited are a matter of learning" (p. 35).

For other references on bird behavior see Nos. 8, 9, 12, 35, 48, 50 and 53.

PHYSIOLOGICAL EXPERIMENTS

35. Sexual Behavior of Intersexual Domestic Fowl. L. V. Domm and D. E. Davis. 1941. *Proc. Soc. Exp. Biol. & Med.*, 48: 665–667. Intersexual birds are "produced by the injection of estrogens into the eggs on or before the fourth day of incubation"; males develop into intersexes of varying degrees of femininity. They were tested with a rooster, a hen and a stuffed dummy; their behavior showed "gradations from essentially normal masculine copulatory patterns to neutral or inactive behavior, coinciding in general with the degree of masculinity of plumage." One of the most interesting portions of the paper is that describing the normal method of sex recognition with domestic fowls. "The sex of a newcomer is determined by behavior. The rooster 'waltzes.' . . . thereby inducing the newcomer to either squat or raise the hackle feathers. When a bird is introduced to a rooster, he at once pursues, seeking to determine its sex. If it is a receptive female, she squats for copulation. If, on the other hand, it is a male, it raises the neck hackle and thereupon begins a fight which settles its social rank in the group." This "waltzing" of the rooster has always been considered a "sex-invitation" (see No. 37); apparently it corresponds instead to Tinbergen's "First Reaction" of the Phalarope and Snow Bunting, (1939, *Trans. Linn. Soc. N. Y.* 5).

36. The Sexual Behavior of Hormonally Treated Domestic Fowl. D. E. Davis and L. V. Domm. 1941. *Proc. Soc. Exp. Biol. & Med.*, 48: 667–669. "Both androgen and estrogen, injected into capons, induced the masculine copulatory behavior but only androgen induced crowing and increased or induced the 'tidbitting' and 'waltzing'. In bilaterally ovariectomized poulards, androgen induced crowing and waltzing but did not induce the masculine copulatory behavior, while estrogen, on the contrary, induced the feminine squatting behavior. These results would seem to suggest that certain behavior patterns are common to both sexes of the fowl and may be induced by the appropriate hormone. The masculine copulatory behavior can be induced by both androgen and estrogen but only in genetically determined males." The poulards injected with androgens "violently pecked the normal female and the dummy", The term "tidbit" is used for the behavior when the rooster calls hens to a "real or imaginary morsel." "The 'tidbit' is considered a substitute activity frequently observed when the rooster is frustrated."

37. Induction of Mating Behavior in Male and Female Chicks Following Injection of Sex Hormones. G. K. Noble and A. Zitrin. 1942. *Endocrinology*, 30: 327–334. Two day chicks injected with testosterone propionate crowed forty hours afterwards; fifteen-day chicks injected with sex hormones showed complete sex behavior.

ECOLOGY AND NUMBERS

38. A Wildlife History of Faville Grove, Wisconsin. A. S. Hawkins. 1940. *Trans. Wisconsin Acad. Sci. Arts and Letters*, 32: 29–65. A painstaking reconstruction from early records and from recollections of pioneers of primitive conditions and a comparison with the present status. A very interesting, but depressing record of the flora and fauna for the past 100 years—a sad tale of impoverishment due to settling of the lands and reckless abuse of wildlife. Of 171 breeding birds present during the last century, 51 have been lost—30 per cent! Of game birds, Bobwhite were and are still uncommon; Ruffed Grouse, Prairie Chicken, Canada Goose, Wood Duck and Passenger Pigeon are now gone; the Pheasant and Hungarian Partridge are new and common. Welcome additions to the fauna are the Dickcissel, Tufted Titmouse, Red-bellied Woodpecker and Cardinal that have extended their range northward. "As in plants, the greatest gains have been made by 'weed' species, such as English sparrows, starlings, carp, Norway rats, and house mice" (p. 42).

39. Spread of the Hungarian Partridge in Wisconsin. Aldo Leopold. 1940. *Trans. Wisconsin Acad. Sci., Arts and Letters*, 32: 5–28. Some 5,000 *Perdix perdix* were introduced from 1908–1929 and have spread as far as 102 miles northwest. The furthest spread occurred in 1935–36. "The impulse to venture forth is born of adversity—either the adversity of too many neighbors, or the adversity of killing weather. Each adventure is a blind groping for pastures new, repeated until a favorable year and a good location happen to coincide and bring success." "The location of outthrusts is not selective, for they blindly invade sterile, wooded, marshy, or sandy terrain. Survival, however, is highly selective, and is confined to the richest agricultural soils."

40. Fall and Winter Mortality among Hungarian Partridges in Bottineau and McHenry Counties, North Dakota. M. C. Hammond. 1941. *Journ. Wildlife Management*, 5: 375–382. Known mortality factors were automobiles, elevated wires, and predators. The average count per covey was 12.62 in September 1938, and 10.11 in February 1939; 10.07 in September 1940 and 8.21 in February 1941. "Even during periods of deep snows and extremely low temperatures, all partridges examined [killed by accident] were in very good physical condition, while pheasants in the same localities were often found to be thin and sometimes, apparently, were starving," (p. 376).

41. A Raptor Tally in the Northwest. Aldo Leopold. 1942. *Condor*, 44: 37–38. One raptor was counted to each ten miles of daylight travel through Utah, Nevada and Oregon, July 20 to Aug. 8, 1941. From none to 98 were seen per day. Vultures were omitted and also owls seen at night. There were five concentration areas, all on refuges, all had good stands of grass. "These were the only areas of well grassed open country we saw. Most of the intervening terrain was overgrazed and devoid of perennial grasses, and it was devoid of raptors." Surely a shocking situation. An extraordinary concentration of Short-eared Owls was found in Oregon; 320 were seen in sixteen miles of night driving, gathered to feed on a high population of mice. The raptors were: 87 Sparrow Hawks, 58 Marsh Hawks, 106 Buteos, 37 Short-eared Owls, only 1 Burrowing Owl, 3 Goshawks, 1 Duck Hawk, 1 Prairie Falcon.

42. An Analysis of Waterfowl Hunting at Lake Carl Blackwell, Payne County, Oklahoma. F. M. Baumgartner. 1942. *Journ. Wildlife Management*, 6: 83–91. From 1,000-5,000 waterfowl have frequented this artificial lake (made in 1937) in the fall, 2,000 wintered. Wood Ducks have nested in the drowned trees. The north half is a sanctuary. During the hunting season, 2,086 waterfowl were brought to bag, "probably an equal number were killed, directly or indirectly." A list of eighteen species is given; Green-winged Teal, Redhead and Ruddy were shot out of proportion to their numbers. Several hundred Coot and probably fifty mergansers were also shot, but not brought in. It is estimated that "2.8% of the ducks that stopped at the lake were killed by hunters."

43. Ornithological Observations in Southern India. (Observations on Ornithologiques dans le Sud de l'Inde.) J. Berlioz. 1940. *L'Oiseau*, 10: 298–333. Two biological extremes were visited, humid equatorial and desert regions; in both the town birds were the same: House Crows (*Corvus splendens*), Black Kites (*Milvus govinda*)—both habitual parasites of human habitations, Mynahs (*Acridotheres tristis*), and Collared Parokeets (*Psittacula krameri*), besides Sparrows (*Passer*) and White-rumped Swifts (*Micropus affinis*). Almost everywhere there is destruction of native habitats for raising tea or for industry—a discouraging picture.

44. Ticks Affecting Birds' Eyesight. Ruth H. Thomas. 1941. *Auk*, 58: 590–591. Of 1,253 birds banded in Arkansas, twenty were infested with ticks around the eyes; some the bander was able to save, others were blinded.

45. Eleventh Annual Black Brant Census in California. James Moffitt. 1941. *California Fish and Game*, 27: 216–233. A total of 61,339 *Branta bernicla nigricans* was counted on the California coast Feb. 10, 1941; this is somewhat above the 10-year average of 57,344 birds, but "19 per cent less than the 1940 result of 75,412 brant." Black Brant showed changes in habits, due to the eelgrass shortage, such as feeding on golf courses and pastures, as well as on pickle-weed. "The brant's winter range on the Pacific and Atlantic coasts of North America corresponds with the distribution of eelgrass" (p. 228).

46. Eelgrass Depletion on the Pacific Coast and Its Effect upon Black Brant. James Moffit and Clarence Cottam. 1941. *U. S. Fish and Wildlife Service, Wildlife Leaflet* No. 204: 1–26. A detailed account with a long bibliography on the disappearance by disease of *Zostera marina*. "More than 90 per cent of the plant growth abruptly died out on the coasts of the north Atlantic Ocean from 1931 to 1933, and its recovery was slow and sporadic until 1939. Since that time recovery has been encouraging, the best improvement being in areas of reduced salinity. . . . The depletion of eelgrass on the North American coast of the Atlantic had a very serious effect upon sea brant, causing a reduction of perhaps 80 per cent in the entire population wintering in the region. Since 1938 a gradual decrease in the abundance of eelgrass has been in evidence on the Pacific coast of the United States. . . . It is doubtful, however, that the situation will become as serious as that which developed in the East from 1931 to 1938, because of the more gradual and less virulent attack of the eelgrass disease on the west coast, and because rock grass, which is fairly common in favorable rocky habitats, is known to be an acceptable substitute for eelgrass in the diet of the brant" (p. 21).

BIRDS AND THEIR FOOD

47. Notes on the Food of the California Clapper Rail. James Moffit. 1941. *Condor*, 43: 270–273. Examination of 18 stomachs of *Rallus o. obsoletus* showed that the exotic horse-mussel (*Modiolus demissus*) constituted 66 per cent of the animal food. This Rail is a "threatened species", greatly reduced in numbers in the last fifty years, with a "spotty" distribution on San Francisco Bay.

48. On Piping Plover Feeding. J. T. Nichols. 1941. *Proc. Linn. Soc. N. Y.*, 52–53: 130. Several *Charadrius melodus* were noted "treading" in the water with one foot, obviously "to start small amphipods or what not into active movement at the surface within range." "It would be interesting to know how common such action is with plover. Apparently at least one other shorebird feeds in this manner, since E. H. Forbush (1912) describes observing the Solitary Sandpiper (*Tringa s. solitaria*) stirring up algae at the bottom of a ditch or pond with the rapid and gentle movement of one foot." On June 6, 1939 as I was sitting in the woods above Wintergreen Lake, Augusta, Mich., a Killdeer (*Oxyechus vociferus*) alighted on the shore; probed for a second or two, then looked about. As it stood there it lightly pawed the soft mud with one foot, then the other. This was new behavior to me; never before had I watched a Killdeer completely at ease.

49. Crows (Carrying Off) Potatoes and Maize. (Krähen (*Corvus corone* L.), Kartoffeln (*Solanum tuberosum*) und Mais (*Zea mays*). W. Vogt. 1941. *Ornithologische Beobachter*, 38: 141–142. Carrion Crows in Switzerland were seen carrying off potatoes in their bills, also half of a corn cob.

50. Predation of Boat-Tailed Grackles on Feeding Glossy Ibises. A. Sprunt, Jr. 1941. *Auk*, 58: 587–588. Flocks of *Plegadis f. falcinellus* feed on crayfish in Florida and are attended by large numbers of *Cassidix mexicanus westoni*. Whenever an ibis would get a crayfish, it would spring into the air, followed by three or four grackles that would usually get the prey. "Sometimes, these battles would take place a few feet above ground, sometimes as much as

fifty, sixty or a hundred, but only in the rarest instances did the ibis succeed in getting away with its catch!" "It would seem that the ibises could easily have swallowed their catch on the ground."

BOOKS

51. The Handbook of British Birds, Volume V. Terns to Gamebirds. H. F. Witherby, F. C. R. Jourdain, N. F. Ticehurst and B. W. Tucker. 1941. H. F. & G. Witherby Ltd., 326 High Holborn, London, W. C., England. 356 pp. 21/. The last volume of this superb set has now appeared. It treats the Gulls, Terns, Auks, Rails, and Gamebirds. It also includes 27 pages of Additions and Corrections, which bring the volumes up to date to March 1941, the Systematic List (see No. 52), and Indices. Throughout the work the plan is as follows: under each bird are given—Habitat, Field characters and general habits, Voice, Display and posturing, Breeding—including nest, eggs, breeding-season, incubation (length and by which parent), fledging—Food, Distribution, Migrations—often with maps and giving results of banding—, Distribution Abroad, detailed Description, Characters and allied forms. Excellent plates in color by M. A. Kockock illustrate practically all possible plumages.

This set is undoubtedly the highest achievement yet made in a treatise on the birds of a country, for it gives a maximum of dependable information in succinct form on the *living bird*. It may well serve as a model and an inspiration for ornithological work in the rest of the world. I wish that in our country, instead of lavishing time and money on elaborate State books that are handsome to look at, but really do little to advance our knowledge, that field students would get together to work for a *real handbook* that would give *definite* information on fundamental problems, not hearsay nor guesses nor errors repeated for a hundred years.

Mr. Witherby writes me that "in the Handbook we included and treated fully 170 birds also included in the A. O. U. Check List and besides them there are 30 others with nearly allied subspecies on your list." So for many of our own birds the Handbook of British Birds has amassed more information than we can find in any one volume in any American work. The price of the set is 5 pounds; with the rate of exchange it comes to a little over $23.00. American dollars to England will help win the war. This Handbook in our Universities, libraries and studies of serious students of life history problems will be an invaluable asset.

52. A Check List of British Birds. With a Short Account of the Status of Each. (Revised Edition). Compiled from "The Handbook of British Birds." H. F. Witherby. 1941. London. Witherby. 78 pp. 5/. A very convenient small book with scientific and English names and a brief statement as to status. The fact that every other page is blank makes it suitable for "reference notes, local lists, labelling, etc." A total of 520 forms is listed, of which 219 "breed or have bred in the present century", 82 are "regular winter-visitors and passage-migrants" and 238 are "occasional and irregular visitors," while one, the Great Auk, is extinct.

53. The White-crowned Sparrows (*Zonotrichia leucophrys*) **of the Pacific Seaboard: Environment and Annual Cycle.** Barbara D. Blanchard. 1941. *Univ. California Publ. Zool.*, 46 (1): 1–178. $2.00. An outstanding paper, combining field observation and laboratory technique, life history study and histological examination of collected specimens. Two races of white-crowns winter in the Berkeley region, *nuttalli* being resident, while *pugetensis* breeds in Puget Sound. Elsewhere (*Wilson Bulletin*, March, 1942) I have reviewed the portions on morphological differences between the two races and the studies of the gonad cycles; here I will give some of the highlights on life history. Colored bands were used on both races on their breeding territories.

The annual cycle of the Nuttall Sparrow is divided into four periods: base level of fall and winter; rising tide of territorial and sexual instincts; reproduction; and

subsidence. During the first period birds stay on their territories of 0.9 to 1.7 acres; mates keep together, calling *eep*. There is "more or less passive limitation of pairs to their breeding areas in winter, with almost complete tolerance of sojourning strangers" (p. 16). A female defending a bush of pyracantha berries from a neighbor male sang as loudly as he. The "song of the female is identical in pattern with that of the male but is usually fainter, more rapidly uttered, and often incomplete." The immatures are sedentary; they are "individuals foraging on common ground, unified only by fright." Their song is weak and hesitating; the earliest adult song from a juvenile came Nov. 10, the latest immature song was heard Jan. 9; most sing "adult song by early or middle January, when the establishment of territory begins."

In the second period, the male—in January—drives off other birds with song and pursuit; then if he is mated, song ceases. Loud singing, chasing and fighting lasts 22–28 days (this is when immatures and mateless birds get mates); there is then an interval of 46–58 days before song again appears at the start of incubation. The female shows no territorial jealousy except in cases of polygamy. "Her weak song, which continues until nesting time, is not used for advertisement or warning" (p. 20). She does not join in fights and rarely in chases; she usually trills and postures vigorously, "a little apart from the conflict." With the male "Song may express . . . defiance or warning to territorial rivals, the longing for a mate, sexual excitement, concern for territorial boundaries (accompaniment of patrol), eagerness for the female's return to her eggs, and fright or physical shock."

As to reproduction, the female builds and the male watches. One female objected to the observer approaching the nest site six days before real work started. First year females average 3 eggs per set, older females 3.29 eggs. The female incubates for twenty minutes and leaves for seven minutes; the male does not call her off. The male's attention is shifted "to the territory, which he guards by loud, continuous singing and patrol." The young leave at ten days; they are fed till 32–35 days old and then chased and fought by the parents. They wander until the post-juvenile molt, then settle down. Sometimes three broods are fledged.

As to the Puget Sound Sparrow, its breeding behavior is similar, but not so leisurely; there is overlapping of broods and the young become independent at the age of 25–28 days. They take up territory, pair and fledge three broods in four months, while the Nuttall Sparrow does the same in 6.3 months. In the winter there is no tendency to remain paired, but birds do return to the same foraging and roosting spots year after year. "The flocks of Puget Sound Sparrows show a continuous simultaneity, a common responsiveness, producing true flock reactions" (p. 39).

More than half the volume is devoted to a detailed study of the male gonad cycle, which should be read in full and carefully studied. The two races of white-crowns, exposed to the same environmental influences during the winter, show markedly differing rates of gonadal development. This is a notable study, full of valuable first-hand observations.

54. The Grebes. Studies of Waterfowl in British Columbia. J. A. Munro. *Occasional Papers of the British Columbia Provincial Museum*, No. 3: 1–71. Five of the six North American Grebes inhabit British Columbia. "The purpose of this paper is to present (*a*) a summary of their known distribution and seasonal movements in the Province, (*b*) a contribution to the study of moults and plumages in the case of two species [Horned and Eared] and (*c*) life history observations of interest to the ecologist." A great deal of information along these lines is given for the five species. In a general discussion of "Factors Restricting Increase of Grebes", it is pointed out that although grebes lay from two to seven eggs, very few young appear to be raised. "It is believed that in some years at least the total of young surviving is less than the total of breeding pairs" (p. 59). There is some loss of eggs through crows and some through flooding, but

probably more loss comes through mortality of the young. "For the first few days of life young grebe are weak swimmers, so feeble that on open water after they have tried to escape by diving several times it is an easy matter to capture them by hand. At this stage some become entangled in floating algae or submerged vegetation and have not the strength to extricate themselves. Wind, rough waters and heavy rains are other causes of loss. In comparison with young ducks of the same age they are relatively helpless and much less able to overcome the normal hazards of the nesting ground. Parent grebes carry the young on their backs but in other ways exhibit little evidence of care for them, so different from the energy with which female ducks of some species defend their broods" (p. 61).

Young grebes one-fifth to one-quarter grown are often found dead on the nesting grounds, apparently as a result of head injuries. It is suggested that they may have been fatally struck by adults when attempting to climb on their backs, this habit having persisted "even though the parents have become less tolerant." Many Holboell's and Western Grebes die from the effects of internal parasites. "While destructive factors operate upon the young to such an extent that a very small percentage are raised, there is compensation in the probable longevity of healthy adults. They have few natural enemies and "are not subject to loss through hunting." Thus an optimum population appears to be maintained from year to year" (p. 63).

55. "America, My Country." Our People's Heritage. National Audubon Society, 1006 Fifth Ave., N. Y. 48 pp. A plea for vigilance in defending what is left to us of our once vast heritage of wilderness and wild life. When geologists tell us "for hundreds of millions of years to come, the earth will continue to be a comfortably habitable abode for creatures like ourselves" (Mather 1941), what is there going to be left of interest and variety, of beauty and unspoiled nature in this inconceivably long stretch of years to come?

BIRD-BANDING

A Journal of Ornithological Investigation

(Published Quarterly)

James L. Peters, *Editor*
Museum of Comparative Zoology, Cambridge, Massachusetts

Charles L. Whittle, *Assistant Editor*
Hancock, New Hampshire

Associate Editors
- John T. Nichols, American Museum of Natural History, 77th St. and Central Park West, New York, N. Y.
- Mrs. Margaret M. Nice, 5708 Kenwood Avenue, Chicago, Illinois
- Winsor M. Tyler, M.D., 1482 Commonwealth Ave., Brighton, Massachusetts
- Thomas T. McCabe, 2593 Life Science Building, Berkeley, California.

Officers of the three Bird-Banding Associations

Northeastern
- Professor Lawrence B. Chapman, *President*
- Francis Beach White, New Hampshire
- Wendell P. Smith, Vermont
- Harrison F. Lewis, Eastern Canada
- Laurence B. Fletcher, Massachusetts
- James L. Peters, Massachusetts
- Charles L. Whittle, New Hampshire

(Harrison F. Lewis through Charles L. Whittle: *Vice-Presidents*)

- Charles B. Floyd *Secretary and Treasurer*, 210 South St. Boston, Massachusetts

Eastern
- Dr. C. Brooke Worth, *President*
- Robert K. Ungemah, *Treasurer*, 10 Jackson Ave., White Plains, N. Y.
- Horace Groskin, *Secretary*, 219 Glenn Rd., Ardmore, Pa.
- Geoffrey Gill, *Editor*, 24 Overlook Drive, Huntington, Long Island, N. Y.

Inland
- Dr. H. H. Hayes, *President*
- M. J. Magee
- C. C. Ludwig

(M. J. Magee, C. C. Ludwig: *Vice-Presidents*)

- Howard Braun
- M. J. Magee, *Treasurer*
- O. A. Stevens, *Secretary*

State College Station, Fargo, N. D.

All articles and notes should be submitted to the editor. Manuscripts should be double-spaced and written on only one side of the paper. It is desirable that they reach the editor by the first of the month preceding the month of publication.

Subscription price, $2.50 per year. Single number, 75 cents. Subscriptions should be sent to Charles B. Floyd, 210 South Street, Boston, Massachusetts.

Applications for membership in the Northeastern, Eastern and Inland Associations should be sent to their respective secretaries. The annual membership dues are $2.50 per year in the Northeastern Association, and $3.00 in the Eastern Association.

Membership in the Inland Association is $1.00 per year. All members who wish to receive *Bird-Banding* should send $2.00 direct to Charles B. Floyd, 210 South Street, Boston, Mass.

Publications in English and foreign languages for review should be sent to Mrs. Margaret M. Nice, 5708 Kenwood Avenue, Chicago, Illinois, or to Thomas T. McCabe, 2593 Life Science Building, Berkeley, California.

Bound reprints of articles may be had at nominal prices. Unbound stapled reprints are inexpensive, two hundred copies usually costing about two dollars. Fifty copies bound and titled of four to six printed pages cost about five dollars. Reprints should be ordered early by writing to the editor, preferably when manuscripts are submitted for publication. Any number may be ordered.